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Volume 24 September, 1934 Number 9

Epidemic Cerebrospinal Meningitis in China

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EPIDEMIC meningitis like some other diseases has been considered to be relatively less common in China than in the West. It was interesting therefore to discover that several epidemics have already been reported extending over a wide range of the country, and as scientific medicine becomes more general the disease will, we believe, be found as prevalent in China as elsewhere in the world.

PAST INCIDENCE IN CHINA

The most complete epidemiological data at hand are those of the Health Department of the Shanghai Municipal Council.[1]

In 1898 Dr. Arthur Stanley reported 3 deaths in the foreign community, from acute meningitis. There were none in 1899, 1 in 1900, 2 in 1901, and 1 in 1902. From 1903 to 1917 no cases were reported. From 1918 to 1928 there were a few deaths annually, there being 76 in 1920. In 1929 came the severe epidemic with 1,099 reported cases and 403 deaths. In 1930 and 1931 there was a marked drop (Table I).

For Hongkong[2] my references go back only to 1909, and from that year to 1917 no cases were reported. In 1918 came the great epidemic, followed in succeeding years by a gradually falling incidence (Table I). For Macao I have depended entirely on the report of the 1932 epidemic by Dr. Perigrino da Costa.[3] Only a few scattering cases are reported from 1918 to 1931 (Table I).

The history of the disease in Canton is veiled in obscurity except in so far as hospital reports go. In my own experience in Canton there has never been a serious epidemic of the disease. However, a personal note from the city department of health declares that in 1930 there were 257 cases reported with 223 deaths, and in 1931, 77 cases and 9 deaths. One must question seriously the accuracy of these data, because inquiry at the various city hospitals during those years showed that only sporadic cases were seen (see also Table I under Canton Hospital).

Many cases of convulsions in children and tuberculous meningitis in adults have been erroneously diagnosed epidemic meningitis.

The National Epidemic Prevention Bureau's Monthly Returns by Provinces, which, though my files are very

TABLE 1

INCIDENCE OF CEREBROSPINAL MENINGITIS IN DIFFERENT CITIES 1918—1932

Year	Shanghai		Hongkong		Macao		Canton		Canton Hospital	
	Cases (Residon)	Deaths dents ly)	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths
1918	13	1	1,232	968	4				1	1
1919		15	269	204					0	0
1920		76	158	103	6				4	2
1921		29	114*		2				0	0
1922		12	49*		2				6	4
1923		5	106*						0	0
1924		7	32*							
1925		6	64*							
1926		8	13*							
1927		1	26*							
1928		20	21	16						
1929	1,099	403	25	20					3	0
1930	329	201	20	13	1				1	1
1931	292	174	25	16					5	2
1932	107	59	207	122	600	58%	174	36	31	9

* These figures were obtained from Dr. da Costa's Report on Macao, p. 8, and not from the Hongkong Sanitary Reports.

incomplete, report the disease from all of the 18 provinces except Kansu, from which many data are lacking.

PREVIOUS EPIDEMICS IN CHINA

Attention was first forcibly drawn to the occurrence of the disease in China by the Hongkong epidemic of 1918.[4, 5] The first case was reported February 9, but there had probably been cases in January. The maximum incidence occurred in March, after which there was a rapid decrease during April. There were reported 1,232 cases with a mortality of 76 per cent. During this period no cases were officially reported in Canton, but during the year there was 1 fatal case admitted to the Canton Hospital.

The next important epidemic was that reported by Stevenson and Tang,[6] who reported 700 to 800 cases occurring in Luchowfu, Anhwei Province, in 1919–1920. The maximum incidence was in February and March, a sudden change from warm to cold weather, with rain, causing a definite increase. Chief reliance was placed on spinal puncture, the average number per patient being only 3, while many had only 1. The mortality of untreated cases was estimated at 40 per cent; of the treated cases only 5 per cent.

A third important epidemic occurred

in Shanghai in 1929.[7] It reached its height in the third week of April and there was a mortality rate of 46.4 per cent.

MENINGITIS IN 1932

When news came of the epidemic in Macao, many inferred that it had been carried by the thousands of refugees who poured into Macao, Hongkong, and Canton following the Japanese attack upon Shanghai. I therefore wrote to the Commissioner of Public Health of the Shanghai Municipal Council, who replied June 9, 1932:

> I have to state that in my opinion cerebrospinal fever has not been epidemic in Shanghai this year. . . . In regard to meningitis as a whole, it may be of interest to note that there is clear evidence this disease is not usually spread from Shanghai, but spreads to it from surrounding districts, or at any rate this was so during the last epidemic. . . . In regard to the theory that refugees from Shanghai spread meningitis over other portions of the country, I have to state that I cannot see any grounds for this at all. For some reason or other the theory that Shanghai

CHART A—Weekly incidence of meningitis at Macao, 7 Canton hospitals, Hongkong, and Shanghai—January 1 to July 2, 1932

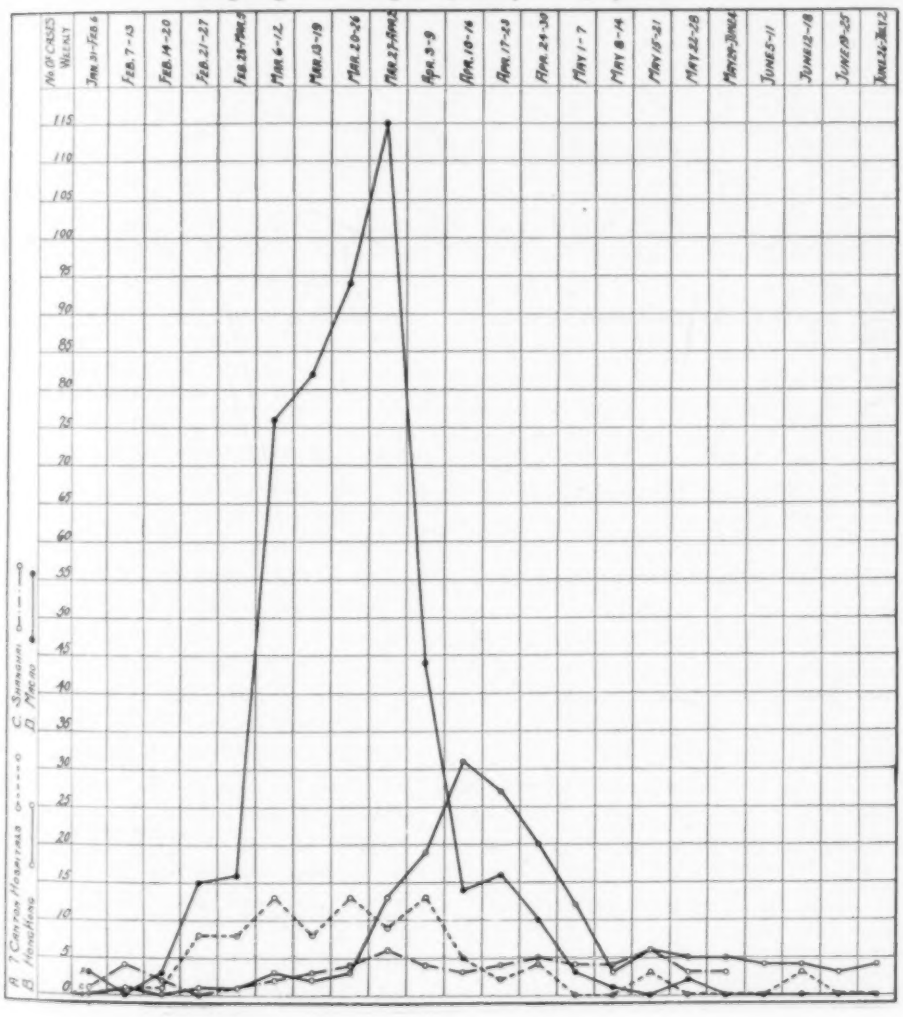
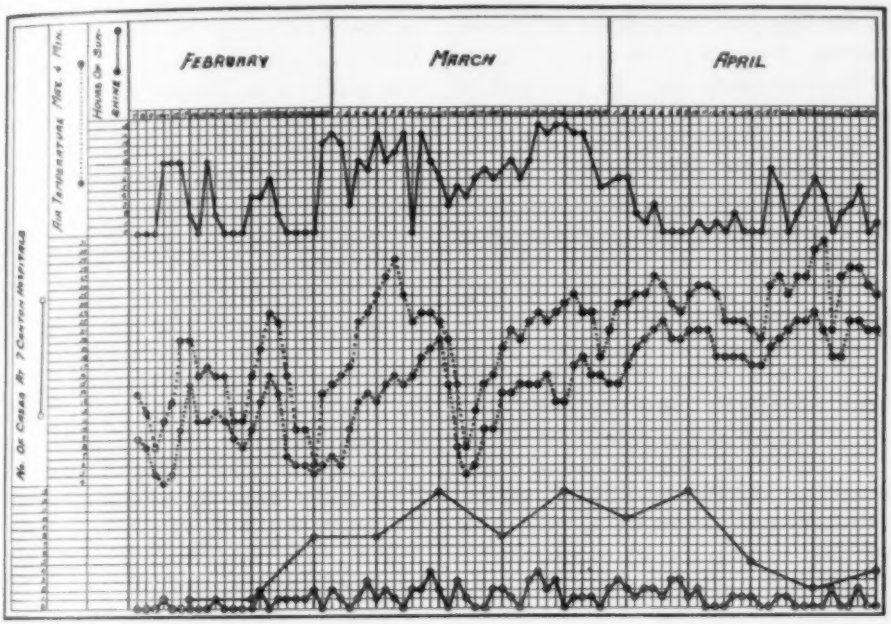


TABLE II
INCIDENCE OF MENINGITIS IN 4 CITIES IN 1932

Time Period	Canton		Hongkong	Shanghai	Macao
	Health Dept	7 Hospitals			
Jan. 1–30	6	4	5	12	1
Jan. 31–Feb. 6	2	0	0	1	3
Feb. 7–13	1	1	1	4	
Feb. 14–20	0	1	0	2	3
Feb. 21–27	0	8	1	0	15
Feb. 28–Mar. 5	1	8	1	1	16
Mar. 6–12	7	13	3	2	76
Mar. 13–19	7	8	2	3	82
Mar. 20–26	11	13	3	4	94
Mar. 27–Apr. 2	14	9	13	6	115
Apr. 3–9	9	13	19	4	44
Apr. 10–16	30	5	31	3	14
Apr. 17–23	18	2	27	4	16
Apr. 24–30	12	4	20	5	10
May 1–7	9		12	4	3
May 8–14	7		3	4	1
May 15–21	7	3	6	6	
May 22–28	0		5	3	2
May 29–June 4	1		5	3	
June 5–11	4		4		
June 12–18	4	3	4		0
June 19–25	2		3		
June 26–July 2	0		4		
July	14	3	5		1
August	3	1	7		1
September	3	1	5		1
October	0	0	3		1
November	1	0	7		0
December	1	1	8		0
Totals	174	101	207	71	499

CHART B—Hours of sunshine, maximum and minimum temperature (Centigrade) compared with the daily and weekly incidence of meningitis at 7 Canton hospitals during February, March, and April. Estimation is made as of day of onset of the disease.



acts as a reservoir for communicable diseases is a favorite one but is not, in my view, supported by evidence.

From January 2 to June 4, 1932, there were only 71 cases reported from Shanghai by the Commissioner of Health, among the resident population, although 58 additional cases among the non-resident population had occurred.

In Macao meningitis assumed truly epidemic proportions a detailed report of which has been prepared by Dr. P. J. Peregrino da Costa.[3] By referring to Table I it will be noted that no epidemic had been previously recorded in the colony. The origin of the 1932 outbreak is unknown, but the disease was rampant in some of the country towns of the neighboring district of Chung Shaan. He suspects that refugees from North China, passing through Macao, brought the disease. The second case was a boy, who had arrived 2 days previously from his native village. Other early cases apparently contracted the disease in Macao. Altogether some 600 cases occurred, in a population of over 100,000, but only 503 were proved.

In Hongkong 207 cases were reported, but the origin of the first cases has not been determined.

With regard to Canton, the data are, of course, far less reliable, and we have collected statistics from several of the leading hospitals in the city in addition to the cases reported by the health department. That these latter figures are only in part reliable is proved by the excessive numbers reported in 1930, when there was no epidemic apparent to workers in the different city hospitals.

For the 1932 epidemic I prepared a questionnaire which was distributed to the chief hospitals in Canton and vicinity. Data were asked for as to the

number of patients seen, with time of onset, duration of disease, and result; also age and sex of patients, number of spinal punctures made, cell count of spinal fluid and white blood cell count, amount of serum given, the occurrence of meningococci, and the presence of Kernig's Sign, headache, stiff neck, eruption, convulsions, and delirium; what measures appeared to be most beneficial in treatment, *i.e.*, spinal puncture, serum and others, and the origin of the epidemic.

Satisfactory replies were received from Canton Hospital, First Sun Yat Sen, David Gregg, Kwong Wah, Leung Kwong, and Kong Tsuen Hospitals. Brief statements were obtained from the Municipal Hospital and Dr. Todd.

From this information and the data from the Health Department, we are able to give the incidence of the Canton epidemic in relation to its appearance in other cities.

By reference to Tables II and III and to the Chart A, one can note that the epidemic appeared first in Macao, beginning in February, reaching its peak in March, and subsiding in April, after which month hardly any cases appeared. The same was practically true of those reported in 7 Canton hospitals where many cases occurred from March 6 to April 16, whereas the Canton Health Department showed the maximum about the middle of April. Cases are reported a week or more after their entrance to the hospitals, and for the 7 hospitals the time was estimated from the day of onset.

The Hongkong Health Department reports a maximum incidence in the middle of April, gradually diminishing in May and June. Thus the disease began in Macao, and was followed a little later by an outbreak in Canton, and the following month in Hongkong. In Shanghai the disease was never very prevalent, but in April and May the highest incidence occurred.

METEOROLOGICAL CONSIDERATIONS

Olitsky[5] in his description of the 1918 epidemic in Hongkong states that the temperature had a marked influence on the incidence of the disease. When there occurred a sudden drop in the temperature the number of cases increased, and *vice versa*—the increase occurring about 4 days later. The influence of sunshine was also noted, a lack of it being followed by an increased incidence in the disease. Humidity and rainfall had little influence.

da Costa,[3] in the 1932 epidemic in Macao, noted that whenever there occurred a pronounced difference between maximum and minimum temperatures on any given day, the number of cases increased after a few days, and concludes that humidity, rainfall, and lack of sunshine have little bearing on the incidence of the disease.

For the Canton cases we have charted (Chart B) the daily and weekly incidence, together with the daily records for hours of sunshine and maximum and minimum temperature, obtained at the Freeman Meteorological Observatory, Lingnan University. The week ending February 27 showed the first decided rise in incidence, following 4 sunless days and a precipitous drop in the temperature to 4°. A week later the temperature rose and there were several sunshiny days. The incidence remained the same. In April there were 2 weeks of sunless days, but moderate temperatures were followed by a gradual decline.

In February there were 12.99 cm. of rain, in March 9.9 cm. and in April 13.41 cm. The average humidity in February was 68 per cent, in March 79 per cent and in April 87 per cent.

The latitude of Shanghai is between 31° and 32° N. The latitudes of Canton, Hongkong, and Macao lie between the Tropic of Cancer and 22° N.

The available data do not reveal any striking correlation between the mete-

TABLE III

INCIDENCE OF DISEASE ACCORDING TO MONTHS IN 4 CITIES 1932

Month	Canton Health Dept.	Seven Canton Hospitals	Shanghai (Residents only)	Hongkong	Macao
Jan.	6	4	12	5	1
Feb.	3	10	7	2	23
March	26	46	10	9	355
April	83	28	22	110	117
May	23	4	17	26	5
June	11	3	39	16	0
July	14	3		9	1
Aug.	3	1		7	1
Sept.	3	1		5	1
Oct.	0	0		3	1
Nov.	1	0		7	0
Dec.	1	1		8	0
Totals	174	101	107	207	505

orological conditions and the rise and fall of the epidemic.

Sex—In the 7 hospitals there were 107 patients whose sex was reported. Of these 60, or 56 per cent, were males, and 47, or 44 per cent, females. In Macao 59 per cent and in Hongkong 65 per cent were males. At the Canton Hospital, of the 31 cases treated 71 per cent were males.

Age—The ages were recorded in 84 patients in 5 general hospitals in Canton: 10–20 years, 40 cases; 21–30 years, 21 cases; under 10 years, 19 cases (1 under 6 months); 31 and over, 4 cases.

It will be noted that nearly one-half of all the cases occurred in the 2nd decade, and one-fourth in the 3rd. Most of the remainder were under 10 years, but few were infants.

At Macao, most of the patients were under 10, but the 10–20 year group were nearly as numerous. In the 3rd decade there were less than one-half the number in the 2nd, and in the 4th decade about one-half those in the 3rd. There were few over 40 years of age.

In the Hongkong epidemic of 1918, the peaks of the curve of incidence, according to age, were from infancy to 5 years and at 17½ years of age.

Duration of Illness—Most of our cases at Canton Hospital as well as in other hospitals were brought in on the 2nd to 4th day of illness, and all cases

TABLE IIIA

Duration of Illness	*Number of Cases*
2– 5 days	26
6–10 days	28
11–15 days	10
16–20 days	15
21–30 days	10
31–40 days	5
41–50 days	3
over 50 days	7

had been ill more than 24 hours. Taking the records of 7 Canton hospitals, the total days of illness are distributed as shown in Table IIIA.

The periods of 6 to 10, and 2 to 5 days, were the most usual; 9 cases each were ill 4 and 6 days. One patient was reported as cured after 87 days, and 1 of the Canton Hospital cases suffered a relapse, but finally recovered after 46 days. We may say that recovery usually requires from 1 to 3 weeks.

Death usually occurred in less than a week after the onset.

MORTALITY STATISTICS

The death rate varies enormously in different epidemics.

In the Anhwei cases [6] the mortality was estimated as 40 per cent for untreated cases and 5 per cent when a simple spinal puncture was performed. In the 1918 Hongkong epidemic the mortality was 76 per cent in spite of serum treatment and spinal puncture. In Shanghai, 1929, there were 46.4 per cent deaths. In 1932, Macao reports a death rate of 59 per cent in the 491 cases which entered the Isolation Hospital. The Medical Department of Hongkong reports a mortality rate of 58 per cent in 1932, while Shanghai had a death rate among residences of the settlement of 55 per cent. The Canton Health Department reported 21 per cent deaths.

In 6 of the Canton Hospitals, from January until June, including the period of the epidemic we have:

	Number of Cases	*Deaths*
Canton Hospital	26	5
Sun Yat Sen	26	12
Kwong Wah	14	4
Leung Kwong	14	7
Municipal	6	2
Totals	86	30 = 34+%

These cases were nearly all verified bacteriologically.

The death rate among later sporadic cases was greater than during the epidemic. At Canton Hospital there were 6 cases from June to September with 4 deaths.

Most fatal cases had been sick but a few days before admission and did not live long. Of 34 deaths in 5 hospitals, 11 had been sick 1 day before admission, 5, 2 days, and 7, 3 days. There were 2 each who had been sick for 4, 5, 6, and 7 days, 1 for 10 days, and 2 for over 14 days.

In Macao of 290 deaths, 63 died on the day of admission and 112 from the 2nd to the 5th day.

Spinal Puncture—This was always done in the lumbar region. It was usually done only once a day, and as symptoms abated, every other day or less frequently, depending on the temperature, the number of cells in the spinal fluid, headache, stiffness of the neck, etc.

At Canton Hospital no case was diagnosed epidemic meningitis unless a spinal puncture had been made and purulent fluid obtained. During the height of the epidemic a child was brought in with high fever, a very stiff neck, and severe headache. Spinal puncture was done and clear fluid obtained under increased pressure. The cell count was not increased. The next day the child showed typical signs of mumps, from which he made an uninterrupted recovery.

One case was punctured 16 times in 51 days and made a good recovery. A sporadic case was punctured 25 times during 41 days and also recovered. In the other Canton hospitals 18 was the highest number of punctures made, 2 or 3 being usual.

In the writer's opinion this procedure is by far the most important means of relieving symptoms and bringing about a cure. Dr. Valentine of Hongkong writes: "No improvement was observed in any case, unless lumbar punc-

ture had been performed." Dr. S. W. Phoon of Tung Wah Hospital, Hongkong, reported that an average of 5 punctures were done per case when treatment was started early.

Spinal Fluid—The spinal fluid in true epidemic meningitis sooner or later becomes cloudy, due to the large number of leucocytes. This is important in the differential diagnosis from tuberculous meningitis, so common in South China. The number of cells, is, we believe, of definite value in determining the progress of the disease and as an indication for further punctures. In 24 of our cases diagnosed epidemic meningitis, meningococci were found. In these the maximum cell count was 3,900, and the minimum 730—average of 1,000 to 2,000. At the Kwong Wah Hospital counts of 15,000 to 18,000 were made. At the Sun Yat Sen Hospital, counts varied in positive cases from 32 to 5,120 cells.

The white blood cell count was invariably raised in the acute cases. In 5 hospitals there were 68 cases in which meningococci were demonstrated and in whom a leucocyte count of the blood was made. Deaths in these cases are shown in Tables IV and V.

TABLE IV

No. of W.B.C. in Blood	*No. of Cases*	*No. of Deaths*	*% Deaths*
9,000 or under	3	3	100%
10,000–14,000	28	6	21%
15,000–19,000	21	9	43%
20,000 and over	16	5	31%

The lowest white count, 7,600, was in a fatal case in whom meningococci were not found. One malignant fatal case had a leucocyte count of 38,000 cells and the spinal fluid was blood-tinged, but contained no meningococci. Of the positive cases the highest leucocyte count was 36,000, and this patient recovered.

We conclude that a white blood cell count of 10,000 to 14,000 is most favorable; a lower count is very grave, and one above 15,000 is serious, but not so bad as the lower count.

OCCURRENCE OF MENINGOCOCCI

Naturally the presence of the organism in the spinal fluid is essential for making an absolute diagnosis of epidemic meningitis. On the other hand, it might be assumed that a case belonged to the epidemic variety: (1) when the spinal cell count exceeded 500; (2) when no other organisms could be found; (3) if the case recovered; in spite of the fact that repeated smears of spinal fluid failed to show the intracellular diplococci.

Thus a positive diagnosis was justifiable in several negative cases. Table V shows the percentage of positive cases in each hospital, judged by presence of meningococci.

TABLE V

Hospital	*No. of Cases*	*No. Positive*
Canton Hospital	31	24
Sun Yat Sen	23	19
Kwong Wah	14	14
Leung Kwong	14	13
David Gregg	13	8
Kong Tsuen	3	3
Total	98	81

About 83 per cent of the cases showed a positive bacteriological finding. In 1 of the hospitals all cases were positive. At Canton Hospital 17 per cent had a positive spinal fluid. In negative cases a search was made for the tubercle bacillus and pus forming organisms, without results, though there were, during 1932, several cases diagnosed tuberculous meningitis, in which the spinal cell count was relatively low and tubercle bacilli were demonstrated, or else no organism was found. All ended fatally.

CLINICAL SIGNS

The occurrence of the common clinical signs is recorded in Table VI.

It will be noted that of the 97 cases in 7 hospitals, 90 were reported with Kernig's sign, but it has been our observation that this is practically always present in genuine cases.

Delirium was recorded in 69 cases, but in 4 the absence was questionable. When a patient is at all conscious, stiffness of the neck is generally present.

Eruptions were conspicuous by their absence. Four cases with purpura were seen at the Sun Yat Sen Hospital, and 18 altogether in the series.

In Macao 50 per cent of the hospitalized cases had convulsions or delirium. There was only 1 case with a purpuric eruption.

Dr. S. W. Phoon reported on 75 cases observed at Tung Wah Hospital in Hongkong and states that Kernig's sign was present in all. Delirium and convulsions were rare, stiff neck was common.

TREATMENT

The one form of treatment of undisputed value is frequent lumbar puncture. Various palliative remedies for control of restlessness and pain are of course to be utilized.

Serum was generally employed in our patients, but the actual benefit from its use may be questioned. The number of spinal punctures varied from 1 to 25. The amount of serum at each dose varied from 10 c.c. to 40 c.c.—usually 20 c.c.—the total amount from 10 c.c. to 285 c.c.

Thus the majority of patients treated in Canton were given one form or another of antimeningococcic serum. I have found none of the Canton doctors very enthusiastic over its therapeutic value, aside from the effect of spinal puncture alone. The sera used were all polyvalent.

SUMMARY

1. Epidemic cerebrospinal meningitis first manifested itself in China in epidemic form at Hongkong in 1918. It became more severe in the 4th week of March and continued to be prevalent until the 2nd week of May. Other epidemics have been reported from Anhwei in 1920 and Shanghai in 1929.

TABLE VI
CLINICAL SIGNS

Name of Hospital	Cases Reported	Kernig's Sign	Headache	Delirium	Stiff Neck	Convulsions	Eruption	
Canton Hospital	31	27	29	17	27	6	1	
Sun Yat Sen	23	23	23	16	17	3	5	4 *purpura*
Kwong Wah	14	11	13	10	11	9	2	
Leung Kwong	14	14	14	11	14	8	5	
Municipal	6	6	6	6	6	6	4	
David Gregg	6	6	6	6	6	3	0	
Kong Tsuen	3	3	3	3	3	3	1	
Totals	97	90	94	69	84	38	18	

2. In 1932 the disease appeared in Macao in epidemic form for the first time in the 4th week of February. It reached its height in March, subsiding during April, and practically ceased early in May.

3. For Canton, according to Health Department statistics, the disease began to increase in the 1st week of March, and continued to be prevalent until the middle of May. Reports from 7 Canton hospitals indicate that the epidemic began in the 3rd week of February and lasted till the end of April.

4. The meteorological conditions in Canton seemed to have little effect on the epidemic.

5. Spinal puncture is essential for accurate diagnosis. It is the most effective therapeutic measure available.

6. Polyvalent anti - meningococcic serum was generally employed intravenously, intramuscularly, and subcutaneously. No especial advantage was noted for these latter methods over the intrathecal. Several brands of serum were employed with no particular preference for any one.

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Johann Peter Frank

DIFFICULT as it is to make a critical study of as vast a work as the "Medizinische Polizey" it is yet more difficult to write an appreciation of it. Although the "System" is judged to be the first modern comprehensive attempt to codify the details of public health administration, little attempt has been made to trace what influence it may have had on the subsequent history of public health. To judge whether Frank was more than a curiosity, a man whose ideals were thoroughly modern but who had little influence, is a major problem in itself. The analyses of his ideas given in this paper can make possible such an evaluation.

To elaborate praises of Frank's penetrating thought, his vision, and his scholarly treatment of his subject would be useless. If these things do not speak for themselves no one can speak for them. To assume a condescending air and smile at his faith in the power of legislation, his inclusion of much superstition and prejudice with the more enduring matter of his discussion, would be equally useless. Kratter [1] in 1888 made an observation which will perhaps serve better as epilogue than anything else which could be said:

If anyone has leisure and desires to refresh himself with a language which has not yet buried thought beneath a professional idiom but still conveys it without embarrassment or reservation, and if anyone enjoys a frank delineation of social conditions—let him read Frank.—By Leona Baumgartner and Elizabeth Mapelsden Ramsey, *Annals of Medical History,* Vol. 6, No. 1 (Jan.), 1934, p. 83.

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Relation of Soil Fertilization with Superphosphates and Rock Phosphate to Fluorine Content of Plants and Drainage Waters*

E. B. HART, PAUL H. PHILLIPS, AND G. BOHSTEDT
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THERE is a widespread interest in fluorine in relation to human and animal life because of its known toxicity and production of mottled teeth in man[1] when ingested in too great a concentration with drinking water. It is well known that rock phosphate from any source contains about 3.5 per cent of fluorine. The application of 1,000 lb. of this material to an acre will add 35 lb. of fluorine. In the prevailing sulphuric acid method for the manufacture of superphosphate, a part of the fluorine is lost or reduced by virtue of dilution with calcium sulphate. Analysis of commercial superphosphate shows a fluorine content of about 1.86 per cent. The fluorine content is about one-half that of rock phosphate.[2] Where electric furnace methods of manufacture of superphosphate—fusion with silicon and carbon—are used, the product is practically free from fluorine. This product finds its use in such materials as baking powders and pure chemicals.

It has been the practice in this and other countries since the development of the mineral theory of plant nutrition to fertilize our soils with superphosphates, and more recently to use the rock phosphate directly. Hopkins[3] at the University of Illinois, was a strong advocate of the direct use of rock phosphate in soil building, advocating applications of 1,000 to 2,000 lb. per acre every few years.

Because of our interest in the fluorine problem growing out of an extended investigation of the effect of feeding rock phosphate to animals, we undertook an investigation of the effect of continued fertilization with fluorine-phosphate carriers on the fluorine content of plant materials and drainage waters. There are several agricultural experiment stations in this country where fertilization with rock phosphate, superphosphate, and bone meal has been in progress for a quarter to half a century, and it was to these stations that we sent in 1933 for the plant materials. We had the coöperation of the stations of Illinois, Indiana, Ohio, Pennsylvania, Tennessee, and Wisconsin.*

From the Ohio Station we secured

* Published with the permission of the Director of the Wisconsin Agricultural Experiment Station.

* Our thanks are due to Dr. Burlison of Illinois, Dr. Wiancko of Indiana, Dr. Barnes of Ohio, Dr. Gardner of Pennsylvania, Dr. MacIntire of Tennessee, and Dr. Musbach of Wisconsin, for their coöperation in securing these samples.

materials from plots that had had rock phosphate treatment for 36 years. Seventeen years of treatment was the shortest period for any plot record. The materials collected consisted of wheat and oats in two cases, plus wheat straw, oat straw, alfalfa, cow pea hay, and mixed hays. The samples were analyzed on an air-dried basis, and the fluorine is expressed in milligrams of air-dried material per kilo. The analysis was made by Armstrong's modification of Willard and Winter's method.[4] The results are given in Table I.

In one column there is an estimation of the amount of fluorine per acre received by the rock phosphate treatment during the entire period of fertilization, varying from 326 lb. in 17 years on the Illinois plot to 60 lb. on the Pennsylvania plot. The estimate is based on the amount of rock phosphate applied and an assumed fluorine content of 3.5 per cent. No estimation was made of the fluorine contributed by the other fertilizers.

There is considerable variation in the fluorine content of these plant materials, from 0.26 mg. per kilo in the wheat grain grown on the bone meal plot of Tennessee, to 2 mg. per kilo in the alfalfa grown on the superphosphate plot at Marshfield, Wis. One factor in this variation is the soil type and its geology. One can find little evidence from the data that the application of rock phosphate or acid phosphate has consistently increased the fluorine content of the plants aboye that of plants grown on soils receiving bone meal or a low fluorine application. In some instances the plan of fertilization involved the application of phosphorus in equivalent amounts, whch makes it probable that in such cases the amount of fluorine added was as high in the superphosphate application as in the rock phosphate treated plots.

In no case had the level of fluorine in the plant tissue analyzed risen to the point of making it dangerous as a source of food for animals. The highest recorded fluorine content was 2 mg. per kilo in alfalfa grown on the superphosphate treated soil at Marshfield, Wis. A cow consuming 20 kilos daily of such roughage would ingest 40 mg. From extensive work at this station the upper limit of safety for a dairy cow is 2.5–3 mg. of fluorine daily per kilo of body weight, or 1,000 to 1,200 mg. These data apparently place the plant tissue analyzed from the rock phosphate and superphosphate treated plots beyond the suspicion of imparting any serious element of danger when used as food materials. What a longer period of application may do should be studied.

Since the plants growing on these high fluorine plots had not shown significant or dangerous increments of fluorine in the periods studied from the standpoint of animal nutrition, we turned to a study of the influence of such fertilization on the fluorine content of drainage water. Fortunately we had the coöperation of Dr. MacIntire, of the Tennessee Agricultural Experiment Station, Knoxville, where lysimeters are in operation under different soil treatments. In January, 1934, following a period of drought, we secured from Dr. MacIntire three samples of water draining through Chickamauga limestone, untreated and treated with superphosphate and rock phosphate. Three additional samples of water from the same plots were sent May, 1934. The soils received the phosphate treatment beginning in 1930 and continued annually through 1933. The annual treatment was made on the basis of 96 lb. of P_2O_5 equivalence per acre. We calculated that this application in the case of rock phosphate during the 4 years has been about 53.7 lb. of fluorine per acre. The data are given in Table II. The analyses were

TABLE I
FLUORINE IN PLANT TISSUE FROM PLOTS RECEIVING VARYING AMOUNTS OF FLUORINE

Place	Time	Treatment	Amount of F lb. per Acre	Plant	Found Mg. per K — air dried
Wisconsin (Marshfield)	1913–33	Manure	140	Alfalfa	1.7
		Manure + R.P.		"	1.6
		Manure + Super		"	2.0
Indiana (Lafayette)	1916–33	Manure	161	Mixed hay	0.82
		Manure + R.P.		"	1.62
		Manure + Super		"	1.72
		Manure + B.M.		"	1.30
Pennsylvania (State College)	1916–33	No fertilizer	60	Wheat grain	0.82
		R.P.			0.94
		Super			0.99
		B.M.			0.32
Pennsylvania (State College)	1916–33	No fertilizer	60	Clover and timothy	0.76
		R.P.			0.90
		Super			0.52
		B.M.			0.57
Ohio (Wooster)	1897–33	No treatment	134	Alfalfa	0.81
		R.P.			1.57
		Super			1.33
Illinois (Aledo Fields)	1916–33	No treatment	326	Oat grain	1.25
		R.P.			1.75
		Super			0.70
		B.M.			1.66
Illinois (Aledo Fields)	1916–33	No treatment	326	Oat straw	0.58
		R.P.			0.93
		Super			1.37
		B.M.			0.64
Tennessee (Knoxville)	1905–33	No treatment	97	Wheat grain	0.30
		R.P.			0.48
		Super			0.46
		B.M.			0.26
Tennessee (Knoxville)	1905–33	No treatment	97	Wheat straw	0.30
		R.P.			0.51
		Super			0.73
		B.M.			0.56
Tennessee (Knoxville)	1905–33	R.P.	294	Cow pea hay	0.95
		Super			0.61
		B.M.			0.63

R.P. = Rock phosphate
Super = Acid phosphate
B.M. = Bone meal

made by the same method as used for the plant tissue.

The data indicate that the phosphate treated areas have led to a marked increase in the fluorine content of the drainage waters, particularly the rock phosphate treated soil. Possibly in both instances—rock phosphate and superphosphate treatment—the fluorine largely escapes into the drainage water, but its rate of escape may be related to its original availability. To answer such questions periodic analyses would be necessary. In one instance—rock

TABLE II

FLUORINE IN DRAINAGE WATERS FROM SOILS RECEIVING VARYING APPLICATIONS OF F-CARRYING PHOSPHATES

Place and time of collection	Time of treatment	Treatment	Am't of F per acre	Mg. per liter
Knoxville, Tennessee Jan., 1934	1930–33	Control	–	0.044
		Super		0.084
		R.P.	53.7	1.710
May, 1934	"	Control	–	0.050
		Super		0.106
		R.P.	53.7	0.118

phosphate treatment—the concentration of fluorine in the water (1.7 mg. per liter) approached the level recorded as sufficient to induce mottling in teeth,[1] namely, 2 mg. per lit. This figure may be unusually high due to the preceding drought and possible concentration of the fluorine in a limited drainage volume. The total volume of drainage water of a year or more and the fluorine concentration therein would be a more accurate method of gauging the degree of contamination. However, if in a 40 in. rainfall there were an actual drainage volume of 10 in., the concentration of fluorine per lit. could amount to 6.3 mg. if all the fluorine were dissolved in the drainage water and the application of rock phosphate had been 400 lb. per acre—not an unusual application.

DISCUSSION

These data raise the question whether our present systems of soil fertilization with fluorine-carrying phosphates may lead to a contamination of drinking waters to a point where they may become dangerous to human health. No attempt is made from these limited data to give an answer, our only purpose being to call attention to it. Already health authorities are making tests for fluorine in public drinking supplies, for the most part qualitative and not quantitative. No attempt, so far as we know, has been made to trace the origin of this fluorine contamination. It no doubt comes from the phosphorite-bearing rocks of the drainage areas. No one would suppose that the more recent recognition of fluorine as a deleterious contaminant of drinking water when in too high a concentration is in any way associated with phosphate fertilizer application, which has neither been of long duration nor on an extensive scale except in limited localities. Is there danger in a century or two of such application? Should public health warrant it, there is probably no reason why phosphate fertilizers cannot be prepared by methods already available that could largely eliminate fluorine contamination—the electric furnace and fuel-fired furnace processes, both of which are able to produce a phosphate of low fluorine content. Cheap power and public demand may be important factors in bringing about this change if it should prove necessary.

SUMMARY

1. Plant materials from plots receiving fluorine-carrying phosphates, such as rock phosphate and acid phosphate, for periods of 16 to 36 years did not show consistent or greatly increased fluorine content over plant materials grown on plots receiving a low fluorine carrying phosphate such as bone meal.

2. Drainage water from a single series of lysimeters in Chickamauga soil at Knoxville, Tenn., showed a particularly high fluorine content where the soil had been treated with rock phosphate, and a definitely increased fluorine content when treated with superphosphate as compared to the control.

3. These results in respect to drainage water raise the important question as to the ultimate influence of our present system of fertilization with rock phosphate or superphosphate as now manufactured upon the fluorine content of drinking waters and their relation to public health.

4. With our limited available data nothing further is intended in this article than to call to the attention of public health officials,

agronomists, and fertilizer manufacturers the problem that confronts them in the present practice of adding fluorine to our soils.

NOTE: Our thanks are due Dr. Chang Y. Chang and Kenneth Haman for assistance in securing the analytical data used in this paper.

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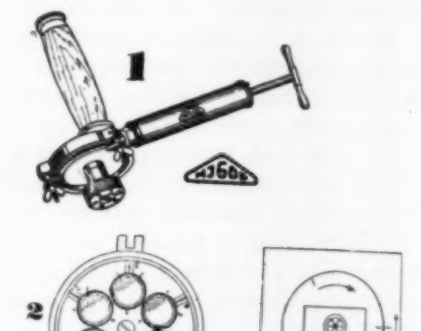
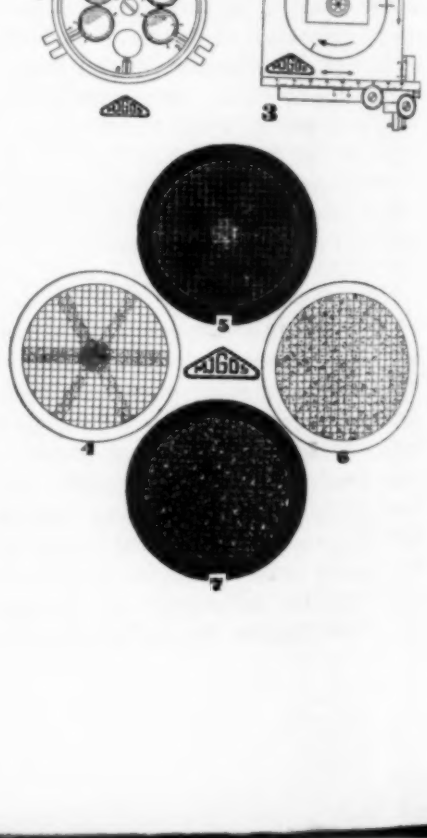
The Dust-Testing Equipment Migos

THE manufacturer of the instrument MIGOS (Arthur Goldberg, Praha, XII, Caslavska 3), which is described herewith, claims that it may be used for determining the quantity, quality, and density of a (suspended) dust, while at the same time making it possible to register dust tests so that comparisons may be made, and control and supervision of the hazard put on a scientific basis. It is stated that the equipment as described will take 15 consecutive tests at a given operation and is priced at Kč 2750 (the current foreign exchange on Kč or Czeko-Slavakian kronen is about 4.20 cents). In addition to the instrument itself, a microscope must be used for examining the dust fields secured at tests. E. R. H.





CAPTION TO CUT

1. The dust-testing equipment Migos.
2. A metal revolving disk of the drum of Migos ready for testing with 5 cover glasses for acceptance of 15 dust-tests, 5 dust-belting stars, with the opening for ventilation.
3. The revolving cross-table Migos from Arthur Goldberg for fast, convenient, and systematic counting of dust grains.
4. Microscopical picture of the dust-belting star, 3 dust-tests, in the dust-testing equipment with quadratic net.
5. The same picture with dark irradiation of the field.
6. A microscopical picture of a part of the dust belt in the dust-testing equipment with quadratic net.
7. The same picture with dark irradiation of the field.

Should Public Health Administrative Practice Include Medical Relief Activities?

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NO discussion of any topic can proceed without a common premise or an agreed definition, and here may ensue our first disagreement. Despite a fairly definite conception of modern public health principles by most of us, we must concede that these are the result of accretion over a comparatively brief span of time. So brief, in fact, that we can well question whether they are firmly established, or whether they are not subject to alteration. The existence of a standing Committee on Administrative Practice of the American Public Health Association and the conduct of numerous field studies by the U. S. Public Health Service would indicate that these principles or standards might at least be subject to refinement.

Three-quarters of a century ago under the leadership of Pettenkofer in Germany and of Waring in England, public health work was founded almost entirely upon sanitation. The belief prevailed that the elimination of disease required only the elimination of filth and nuisances. This belief still persists in many communities, and health departments in such communities perform little else than sanitation duties, which contribute to our sense of esthetics but little to the actual prevention of disease.

In his famous treatise on *Typhoid Fever*, Sir William Budd suggested that filth might be of several classes, but that primarily it is human filth which should arouse our concern. This, with the work of Pasteur and the demonstration of bacteria transmitted from man to man as causative factors of disease, brought other ideas in public health. Pasteur said, "It is within the power of man to banish contagion from the face of the earth." And his early exponents believed that by isolation of known infected individuals (*i.e.*, those actually suffering from infectious disease) communicable diseases could most certainly be controlled and abolished.

From this was evolved the quarantine and disinfection theory of disease control, which has been carried to the *nth* degree of perfection, and by many to the point of absurdity. While it has had its accomplishments, it failed to consider the apparently healthy carrier, or persons with various degrees of immunity, who utterly escaped the meshes of quarantine and continued to be spreaders of infection.

Medical men were long acquainted with the fact that inoculation with "cowpox" protected against smallpox. Study of this principle led to belief that similar immunity might be artificially conferred against other diseases, and in several instances (notably in diphtheria and typhoid fever) efforts along this line have been successful. Doubtless

this list of immunizing agents will constantly increase.

But there have been disappointments. In tuberculosis, for instance, Koch and others believed that the use of tuberculin might afford protection against the disease. Those early efforts resulted in failure, but the experimental work of Calmette is now reviving those hopes.

In the meantime, the study of tuberculosis indicated that habits and environment of individuals play a crucial part in permitting transfer of infection or in maintaining resistance of these individuals, and from this we have learned that, to a considerable extent, habits and environments play an important rôle in many other diseases. This is particularly true of the nutritional disorders. From this knowledge, the sphere of sociology has been added to the realm of public health.

The inculcation of proper principles of housing, living and working conditions, and the cultivation of health habits in our population are of vital importance in the reduction of sickness and death rates and the promotion of health, efficiency, and longevity.

But the cultivation of health habits presumes knowledge of their intent and value, and our tuberculosis, school health, and child hygiene studies have taught us that this knowledge is more effective when dispensed to indicated and concerned individuals than when it is dissipated over unreceptive multitudes. And thus public health education has come to involve not only the dispensing of knowledge, but the inspection or examination of individuals to indicate not only those in greatest need of knowledge but also the specific type of instruction which they need.

To summarize: Public health activities have gradually developed until today they include facilities for (1) sanitating the community, (2) prompt recognition of communicable diseases and the limitation of movements of those afflicted by them, (3) discovery of healthy or immune carriers, (4) promoting immunization against diseases in which immunization has been reduced to a degree of certainty, (5) discovering by physical examinations disabilities which reduce individual efficiency or resistance to disease, and (6) promoting general community and individual knowledge as to right habits of living, working, diet, and recreation, and thus promoting general longevity and increased efficiency and happiness.

Thus far in this interpretation of public health standards, I dare say we as public health workers are practically agreed. Yet, so recent has been their acquisition, we do not find them fully recognized by professional and lay groups.

Perhaps the first—that of sanitating the community—is most generally conceded as being within the province of the health department, including as it does the supervision of foods, water, sewage disposal, and other things most obvious to the olfactory sense.

One would believe that no disagreement would exist in the second and third; but every health officer still has within his jurisdiction many lay persons, and even some professionals, who adhere to the idea that acute contagion is a matter of private and not public concern, and resent the prying methods of health officials. When applied to more chronic conditions, no matter how infectious, such as tuberculosis and venereal disease, there is open opposition, and, sadly, from groups which often profess most ardent support of this principle.

The fourth, despite the doctrine of Edward Jenner a century and a half ago, is still shadowy to some; but the reflection that its value lies in its universal application to susceptible groups must eventually, if not soon, dissipate controversy. In many states, in fact, in most of them, its compulsory appli-

cation at times and under certain conditions places it within the police powers of the state—powers which must be exercised regardless of fees or privileges, in recognition of the fact that in the protection of all, the community can no more tolerate material susceptible to epidemics than it can tolerate inflammable material which may result in conflagration.

The fifth has long been recognized as the basis of our school health and physical education system. Its application to other than this constitutes only an alteration in age grouping. In maternity and infant hygiene, and indeed in life extension, it is most vital.

On the sixth, the *general* dissemination of knowledge is an accepted duty in which the public health department must lead, but its dispensation to individuals is still a matter of resentment in some fields. Just how a public official in performance of his duty may refuse information, more especially when it involves matters of no particular scientific mystery and should be of common knowledge, is somewhat difficult to appreciate, for thus far in this program we are seeking only to prevent illness—a field in which there can be no monopoly—and such a consummation is what the public has a right to expect in return for its financial support of its health department.

The health department is an official agency created for the benefit of all citizens. Its sanitation, educational, and disease prevention facilities should be accessible to the rich, the person of moderate means, the near indigent, and the indigent. Wealth does not bespeak superior intelligence, greater knowledge of sanitation and hygiene, willingness to seek protection against contagion, or respect and observance of law or the rights of others. The palace dweller with infection may be potentially a greater menace to community security than the one in the slums.

If it is suspected that my interpretation of public health standards is individualistic, perhaps a definition by Dr. C.-E. A. Winslow, Dean of the School of Preventive Medicine and Public Health at Yale University, may clarify my mental gropings. He states:

> Public health is the science and art of preventing disease, prolonging life, and promoting physical health and efficiency, through organized community efforts for the sanitation of the environment, the control of community infections, the education of *the individual* in principles of personal hygiene, the organization of medical and nursing service for the early diagnosis and preventive treatment of disease, and the development of the social machinery which will insure to every individual in the community a standard of living adequate for the maintenance of health.

No deviation from these principles is to be found in the standard texts, including Rosenau, Park, and others, nor in the declaration of the Committee on Public Health Administration of the White House Conference of 1929.

In view of the fact that modern public health practice except in our larger cities is an evolution of—we might say—the past two decades, perhaps some of us may recollect what preceded it in the average community. If youth precludes such memories, I might suggest for your enlightenment the reading of the life of one "Doctor Bull" in a recent popular novel, which, aside from certain personal characteristics and moral standards, exemplifies quite admirably the duties and performances of the average community health officer of that period. Having served as such an one, I can speak with a certain degree of knowledge.

Custom and law demanded the appointment of a community physician, whose designation as the "pauper doctor" or the "poor doctor" (in many instances both titles were correct) indicated his main duties, *i.e.*, the care of the indigent sick. His incidental (I am sure this is the right word)

duties were those of sanitary inspection and quarantine. To the fact that many of these served conscientiously, and that particularly they enhanced the public perspective and value of the apparently incidental duties, we can attribute much of our present advances in public health. True, there were leaders (and one could mention a score or more of such) who gave these incidental duties perspective, and thereby gave dignity and prestige to the profession and science of public health and preventive medicine, divorcing it, as it were, from the dispensation of charity.

This paper is not meant to discredit the dispensation of charity, or minimize the importance of its scientific administration. It is only meant to emphasize what has been said before, *i.e.*, that the public health department is an agency designed to serve all of the population, whereas the charitable agency serves but a small percentage. Confusion of the objectives of each can only lead to loss of efficiency and the value of both.

Reflection on certain angles may differentiate and bring us to the real consideration of my topic.

First: With the well-to-do citizen or even to one of moderate means, the direction of attention to a physical defect or to faulty habit or environment is generally sufficient—he will seek the remedy and provide it. But for the citizen without means, the community must do more—it must provide the remedy, not only from the standpoint of humaneness, but for the general welfare and prosperity—indeed, many times for the preservation of the life of the community.

The care and treatment of the indigent sick is a generally recognized sociological duty and, in California especially, our splendid public hospitals are outstanding examples of our belief in it. Without them the consummation of public health teaching is not possible in that portion of our population who may be in greatest need of such teaching, and public health efforts are limited in results. Close coöperation between health activities and charity is an essential, for just as sickness is the result of indigency, so also is indigency the result of sickness. But while the two functions are linked together, they still remain *two* functions, separate and distinct, and it behooves the health department who seeks to maintain its true entity to consider well how it may preserve this free from public confusion.

Under California State law, charitable relief work (and this includes medical relief) is recognized as a separate legal function from that of public health. Provision must be made for separate financing and administration. While health officials, as such, may and should act in an advisory capacity to an administrative board of charity, they cannot legally direct the acts or policies of such a board. But public conception of this is not general, and the health department which by assumption of any form of charitable relief permits this popular confusion to occur or continue, will find itself held responsible for errors of omission and commission in the acts of others whom it cannot direct or control. Similarly the charitable relief work merges itself in the public mind with the health department, and finds its identity lost. The departmental welfare and preservation of both demand the most complete separation possible in administration and even in housing.

Second: While it is the duty of the public health department to direct attention to ill health or to physical defects, it is not its duty, except in the control and elimination of communicable infections, to furnish treatment of sickness or correction of defects for any. Those able to pay are referred to the private professional; the near indigent or the indigent are referred to charitable sources. In those communi-

ties able to afford educational or health centers under public health auspices, it has been found in numerous instances that the conduct of a charitable treatment clinic upon the same premises creates a marked decline in general public attendance and demand for educational facilities. The person of moderate means avoids the least inference or implication of charity; others fear known probability of contact with the sick. These remain away and they constitute many times the number of the indigent. The health center becomes only a sickness or disease center and its entire intent of prevention is lost. The department as a health promotion agency is a failure and economically unsound.

Third: The conduct of treatment clinics or medical relief activities under any management will always be attended by friction in the professions, both medical and dental, for even the best of social service will not insure the debarment of the unworthy. Professional men, too, fail to discriminate between true preventive medicine and charitable relief, and in consequence condemn all health work, fearing its encroachment upon the private field, which is the reverse of true public health accomplishment.

This cannot be ignored. The physician may concur in the physical examination for the discovery of physical defects but he objects, not only as a physician but as a taxpayer, to the correction of these defects at public expense, that is, in those able to pay. Is he not right? If a sanitary inspector discovers a plumbing defect, the health department does not maintain free plumbing repair service.

In the control of communicable disease, the physician is the sentinel on duty. His good will and coöperation are most necessary for successful control. The conduct of treatment clinics does not enhance cordiality, and tends to create friction in those quarters upon which the department is dependent for the greatest dissemination of health and prevention of disease. The charge of *state medicine*, whatever it may mean to each physician, has played no inconsiderable part in his apathy or opposition to public financial support of many health departments in the past several years.

To one who has had a part for a quarter of a century in the trial and error method of development of public health administrative ideals, it is gratifying to observe the growth in the application and acceptance of these ideals by public opinion. As a member of the medical profession it has been equally gratifying to have played a small part in the development of a branch which should be a most important adjunct and aid to medical practice.

It is somewhat disturbing, therefore, to observe a tendency in some legislative quarters and indeed in some representative members of the medical and public health professions to substitute projects entirely foreign to these original ideas, among them being the centralization of charitable and medical relief, hospitalization, and public health activities. For after all, however well manned or departmental these organizations may be in the larger and well financed communities, we must remember that the pattern will apply to the most remote and less resourceful communities. So—

I am wondering from whence emanate these proposals for consolidation of charitable, medical, and health agencies.

I am wondering if following the expectation of universal public health advice, there will also ensue a demand for universal medical service.

I am wondering if the demand for universal medical service will prove beneficial to the medical practitioner or to the taxpayer.

I am wondering if universal service will be as efficient.

I am wondering if we, as health workers, have failed in our educational efforts, and public appreciation of the care of disease is greater than its prevention.

I am wondering if all our ideals of public health administration and service are incorrect, and we are not keeping abreast of social changes and present-day exigencies.

I am wondering if in our anxiety to maintain our existence and in our envy of those who are receiving large sums of emergency relief funds we are willing to sacrifice the ideals built up by tried and proven experiment.

I am wondering if this proposal to place medical relief activities under public health auspices is not, after all, a tribute to the sociological training and organizing ability of public health leaders; but—

I am wondering if it does not mean that we are to be relegated to the position of "Doctor Bull" of several decades ago.

Is Cancer Becoming More Prevalent?

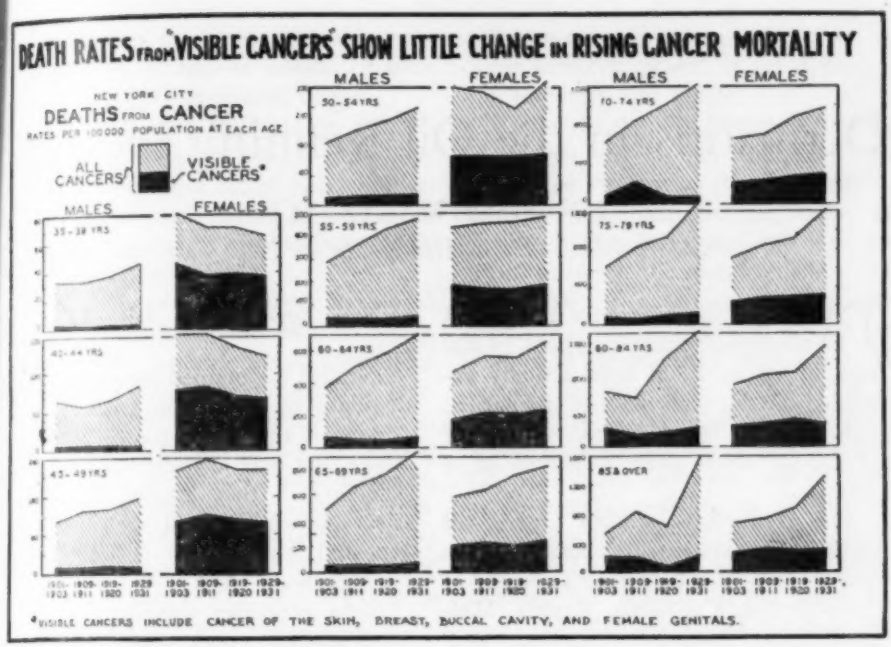
THAT diseases like cancer, diabetes and diseases of the heart and arteries, all of which are associated with the older ages, should show an increase in the registered death rates is natural, for there has been a marked aging of the population. In New York City, for example, the proportion of persons over 45 years of age is now one-third greater than it was only a generation ago. No one denies that this aging of the population has brought with it an increase in the death rate of the diseases associated with the older ages. But as the heading of this article is usually interpreted there are those who believe that, apart from the age factor, some or all of the diseases mentioned above have actually become more prevalent in recent years.

The actual number of deaths involved in cancer, diabetes, and diseases of the heart and arteries is so great that a real increased prevalence, beyond that due to aging of the population, should manifest itself by an increase in the specific death rates in the higher age groups. However, when we examine the specific death rates for New York City no such increase can be discovered. In fact, the specific death rates, even in the higher age groups, show a decline during the past thirty years.

It is instructive to analyze the course of our cancer death rate, not for all forms of cancer, but, as is done below, for "visible" and "other" forms of cancer. In this way we deal with one of the important factors which must be reckoned with, namely, diagnosis. Under the heading "visible" cancers we have included cancer of the skin, breast, buccal cavity, and female genitals. Some idea of the number of deaths involved under the term "visible" cancers can be gained from the following figures showing such cancer deaths during the three years 1929–31:

	Males	*Females*
Cancer of the skin	212	81
Cancer of the breast	32	2,158
Cancer of the buccal cavity	718	111
Cancer of female genitals	...	2,651
Total	962	5,001

The graph tells its own story. Whereas the death rate charged to cancer generally shows an upward trend



during the past 30 years, the death rate from "visible" cancers shows practically no change. If cancer were actually becoming more prevalent in the various age groups, it would be strange not to have the visible cancers participate in this increase. . . .—Charles Bolduan and Louis Weiner. *Quart. Bull.*, Dept. of Health, New York, N. Y. 11, 1, 1934.

Dermatitis in the Oil Refining Industry*

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THIS paper is based on a study of 8 oil refineries employing about 14,000 men, of whom 4,500 were actually examined for the occurrence of dermatitis, and also on the sickness records of 11,000 of them over a period of 2 years.

The refineries studied used all varieties of crude oil obtained from North and South America, such as Pennsylvania, California, Ranger, Mid-Continental, Mexican, Peruvian, Venezuelan, and Texan. These crudes are classified as having paraffin, asphalt, naphthenic or mixed bases, and their character, as well as the final products desired, determines the refining process.

There were no marked differences in the skin conditions found in the various refineries using different crudes, except in those refineries where a paraffin base crude was used in the manufacture of paraffin.

PROCESS

The crude oil is distilled in batteries of stills and a number of cuts are made at different times in the process. Coke is the final residue in the still except where an asphalt base crude is used.

To remove various deleterious products from the distillates they are treated with sulphuric acid, caustic soda, fuller's earth, liquid sulphur dioxide, and sometimes "sweetening" with litharge and flowers of sulphur, or with sodium hypochlorite and chloride of lime.

Paraffin is obtained from the paraffin distillate of a paraffin base crude by passing it through a cooled plate press where the wax collects on the plates. The press is then opened and the wax is scraped off by hand, then purified by repeated "sweating" and by passing through bone black.

Some refineries manufacture various by-products, such as insecticides, greases, and wax products. The insecticides are made by using extract of pyrethrum flowers in various petroleum distillates. Greases are manufactured by mixing soap and lubricating oil in various proportions. Candles are made of paraffin by molding, or by dipping wicks repeatedly in the molten paraffin until the required thickness is acquired. Aniline dyes are used for coloring. No cases of dermatitis were observed in either the grease or the candle making, but many cases of dermatitis occurred in the manufacture of insecticides, due to hypersensitivity to pyrethrum flowers.

PRESENT SURVEY

The sickness records showed that 196 cases diagnosed as industrial dermatitis occurred among 11,000 workers during the period of 2 years.

In 1 refinery, where complete records were kept, of 16,000 treatments, 202 were skin cases which may have been of industrial origin, or about 1¼ per cent, and 128 skin cases that were diagnosed as not of industrial origin.

* Read before the Industrial Hygiene Section of the American Public Health Association at the Sixty-second Annual Meeting in Indianapolis, Ind., October 10, 1933.

In the present survey, 488 skin conditions were found, of which 25 were distinctly not of industrial origin.

The chief skin hazards in oil refining seem to be burns from explosions and fires, or from acids and alkalies. Oil acne and papillomata, as well as an excessive amount of epithelioma, result from oil and paraffin.

About 10 per cent of those examined showed on the dorsum of the hands and on the forearms, and sometimes even on the legs, many pin-head to pea-size flat, small, pigmented papillomata. These occur in greater proportion among machinists, mechanics, and laborers, whose hands are usually covered with oil, grease, and dirt. A similar condition has been described as occurring in about 25 per cent of men working in Dutch briquette factories.

Telangiectatic spots were found on the exposed parts of the skin of many of the laborers. They were from pin-head to dime size, and disappeared on stretching of the skin. They are caused by exposure to hot coke when cleaning out the residue from the stills, and also from dipping the hands into hot paraffin during the "sweating" process. It was noted that colored laborers did not show these spots.

Many observers have noted an excessive number of skin cancers among workers in oil and wax. In this study, 12 cases were encountered—3 on the face, 6 on the lip, 1 on the hand, 1 on the ear, and 1 on the scrotum. The last was on a paraffin pressman who also had an epithelioma on the dorsum of the hand.

Three of the refineries examined pressed paraffin, and 81 men who worked on the presses were examined. Characteristic wax warts were found on the hands and forearms of 25 of them. These wax warts differ in appearance from the papillomata described among workers in oil and grease. They are more raised, more verrucous, non-pigmented, and often occur on the inner surfaces, as well as the dorsum of the forearms and hands.

Among 81 paraffin pressmen, 19 cases of oil acne were found. Oil acne differs from acne vulgaris in that it occurs not on the face, but on the arms, the shoulders, the body, and the legs, and forms around the hair follicle. The lesions of oil acne are elevated, erythematous, indurated, and about pea size, and when they suppurate are known as wax boils. One case of epithelioma of the scrotum was found. This man also had many wax warts on his hands and forearms, one of which was undergoing epitheliomatous changes.

Burns are frequent in oil refineries. They occur from fires, explosions, cleaning hot coke from the stills, and also from the acids and caustics used in the refining process.

When acid-tanks are being cleaned of sludge, and in that part of the plant where sulphuric acid is recovered and reconcentrated, acid burns are of frequent occurrence.

The tanks in which the oil and gasoline are neutralized with caustic soda must be cleaned at regular intervals, and caustic burns occur during this process, from contact with the caustic deposited on the sides of the tank. The cleaning of old barrels with caustic soda occasionally causes a dermatitis in a sensitive worker.

Sometimes a worker is met with, who after a number of years of work in the refinery becomes sensitized to gasoline and develops chronic dermatitis.

Epidermophytoses and tricophytides occur among refinery workers, as well as among the rest of the population, and are often mistaken for dermatitis of industrial origin. In the present study no attempt was made to examine the feet of the workers for tinea infections, but 11 cases of tinea of the hands and 1 of monilia infection of the webs of the fingers were found.

PREVENTIVE MEASURES

Most of the refineries provide safety appliances for the prevention of burns from acids, caustics, and coke. These appliances consist of rubber suits, goggles, and gas masks, which the men are compelled to wear when entering acid or caustic tanks. Nearly all of the refineries have shower baths placed throughout the area where acid and alkali burns are apt to occur, so that men splashed can immediately step under the showers. There are also large bath tubs filled with water so that men when burned can be immediately plunged into them.

The burns in coke stills usually occur in the old-style type, where there are manholes through which the men must enter to clean them. These are being replaced as soon as they are worn out with new-style ones in which mechanical means are employed for cleaning out the coke.

The pigmented papillomata occurring among workers in oil and grease could in a large measure be prevented by the compulsory wearing of gloves and compelling the men to wash their hands with soap and water at noon, before eating their lunch and immediately after they stop work for the day.

Oil acne and wax warts among the paraffin pressmen can also be prevented by compelling them to take shower baths, using plenty of soap, immediately after stopping work for the day, and changing to clean clothes. They should also be compelled to have their working clothes washed once a week because they become saturated with oil. In addition to this, the maintenance of an efficient medical and first-aid department, preferably with a full-time medical officer and a registered nurse, physical examination of new employees, and yearly examination of all employees are recommended.

The Controversy About Pasteurized Milk

THE controversy on the pasteurization of milk, described in previous letters, has been continued in the *Times*. A. Bradford Hill, W. W. Jameson and W. W. C. Topley, of the London School of Hygiene and Tropical Medicine, reply to the argument that in a population of 9,000,000 children in this country under the age of 15 only about 4,000 cases of bovine tuberculosis occur annually, or 1 case in 2,200 children per annum. The proportion of children who eventually suffer must be much higher. It can be estimated that between 1 in 100 and 1 in 200 children develop the disease before the age of 15. Milk-borne diseases other than tuberculosis are by no means as negligible as the opponents of pasteurization state. Between 1912 and 1931 there were reported at least 81 outbreaks of various diseases due to milk. In 1929 there occurred a severe epidemic of septic sore throat involving more than 1,000 families, with 65 deaths, and in 1931 an outbreak of 312 cases of paratyphoid fever, with 6 deaths.—London Letter, *J.A.M.A.*, June 23, 1934, p. 2124.

What Can We Learn from Child Health Conditions in Europe?*

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REFLECTION upon the evolution of maternal and child care in Europe at once brings to mind our indebtedness to the pioneers in antenatal hygiene, infant metabolism, nutrition, and child sociology. We hold in grateful appreciation the work of a galaxy of European scientists who have laid firm foundations upon which we have builded in the fields of sanitation, preventive pediatrics, and social medicine. Our technics and organization for prenatal centers, maternity benefits, milk stations, infant welfare clinics, day nurseries, nursery schools, and school hygiene bear the original imprint of contributions from abroad. These we have adapted, with minor modifications, to American conditions, and have added certain unique features of our own.

It is not the intention of this paper, however, to dwell upon historical developments. That has been done exceedingly well by others. The purpose here is to sketch in outline present-day conditions and trends in some of the European countries, which may suggest to us ways and means of improving our own maternal and child health.

In Europe child hygiene is considered a definite part of the public health and is integrated with every other health function in the community. The trend abroad in administration of all welfare measures is decidedly in the direction of public control, concentrating authority in the hands of full-time, technically trained, public officials. Voluntary organizations may, and do, carry on certain phases of maternal and child health work, but always in close cooperation with official agencies.

It is recognized that the first duty of the state is to protect its mothers and children and to promote their welfare. This has been done abroad largely through some form of social insurance, which is undoubtedly one of the strong points of the European system.

An amazing fact in Europe today is the foresight and vigor with which governmental schemes for maternal and child health are being pursued. Wherever we look—in democratic England, bureaucratic France, Fascist Italy, Nazi Germany, Nazi-Fascist Austria, Communistic Russia, or dictatorial Jugoslavia and Poland—similar phenomena present themselves. Whatever the form of government, a desperate struggle is on to preserve, strengthen, and extend services for the welfare of mothers and children. Economic distress appears to be the only inhibiting factor. Mixed motives—humanitarian, utilitarian, socialistic, and militaristic—are discernable; but the net outcome in each instance is more active interest in the health and well-being of mothers and children and more ample provisions for them. In this very fact itself lies a great lesson for America.

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England—From the beginning of the 20th century a code of regulations for the health protection of mothers, prospective mothers, and children has been developing in England, Scotland, and Wales. The most recent act—The Children and Young Persons Act of 1932 Amending the Children's Act, 1908 — consolidates various public health and welfare measures for children. It extends the powers of health visitors and public health nurses in the welfare schemes. The duties of health visitors and school nurses may be merged and carried out under local authorities. The health visitors may be qualified as midwives, and many of them are performing this function satisfactorily in the counties of England.

There is much better control of midwifery in most European countries than in America. More adequate facilities are available for the training and supervision of midwives. Prenatal and obstetric care is afforded all classes in the population, largely through maternity benefits under National Health Insurance Acts. The central government has recognized also the importance of granting subsidies for maternity hospitals and prenatal clinics and of compensating local physicians when called in by the midwife. In England there are about 56,000 licensed midwives; but only approximately 14,000 are actively practising. This creates a difficult problem in training and supervision and is economically wasteful.

Grants-in-aid from the central government for local maternity and child health work have done much to stimulate better facilities throughout England. These grants originally were made on the "50—50" basis but in 1929 were changed to "block grants" on the basis of local "need" rather than expenditures. There are at present in England 1,300 prenatal centers, 2,800 infant welfare centers, and about 5,000 health visitors and district nurses.

We still have much to learn from Europe in the way of social insurance, especially in its bearing upon governmental subsidies for maternity benefits, child care, tuberculosis, and venereal disease control. While there has been criticism in England concerning certain details of the health insurance scheme, there is no evidence that either the medical profession or the public cares to abandon it. On the contrary, the expressions of opinion which were heard on every hand were in favor of strengthening and extending it.

In England at present there is a great deal of discussion concerning public housing. The relationship between housing and public health is clearly recognized, and definite steps have been taken by the government to wipe out slum areas and to stimulate the building of sanitary houses for the wage earning classes.

In 1933–1934 over 2,250 slum areas, covering 37,000 houses with 172,000 people, have been condemned. The tendency in England, as in Germany, is toward the construction of small houses on the outskirts of the cities. In England these are going up at the rate of 300,000 a year, over half of which are designed for lower paid wage earners.

France—The French have been pioneers in many phases of child welfare. Her physicians and statesmen have contributed substantially to the advancement of maternal and child hygiene: for example, the organization of crèches (day nurseries), consultations for nurslings (precursors of infant welfare centers), laws for the protection of young children (Loi Roussel), medical inspection of school children, and placing of tuberculous children in country homes (Oeuvre Grancher). Experimental research and practical application in immunization against rabies, diphtheria, and tuberculosis are noteworthy.

The French also have organized sev-

eral national associations for the protection of mothers and children and have sponsored a number of brilliant conferences on child welfare and preventive pediatrics. A new publication devoted to child welfare, *Revue Medico-Sociale de L'Enfance*, was initiated in January, 1933.

Home care with public health nursing is a recent development. More interest is manifested in clinical medicine. In actual organization there has been a strong tendency to institutionalize. Elaborate programs are often laid out, and administration tends to become bureaucratic. A number of brilliant suggestions of the French have been taken up by other nations and adapted successfully to their needs.

We can take lessons from France in her provisions for illegitimate children and their mothers, and in the thoroughgoing manner in which provisions for tuberculous children, both from prophylactic and curative sides, have been carried out. While vaccination against tuberculosis has received a setback in Europe due to the unfortunate Lübeck affair, the French are convinced that BCG is a satisfactory and effective method of immunizing young children against tuberculosis. Over 300 doses of the vaccine were being sent out daily from the Pasteur Institute last summer. Fundamental research was being carried on by Armand-Delille on radiography in childhood tuberculosis, which he has since published in Atlas form. A great impetus to child welfare in France was given during and after the war by American pediatricians and other workers under the American Red Cross and the International Health Board of the Rockefeller Foundation.

Germany—In Germany maternal and child hygiene have been placed upon a scientific basis due largely to the investigations and influence of German pediatricians. Czerny, the greatest of German pediatricians, in his classical little book, *Der Arzt als Erzieher des Kindes* (The Doctor as an Educator of the Child), indicates the influence which the pediatrician may have in this field of child welfare. A program for the development of local child welfare centers has been adopted throughout the country. Maternity and infant health centers are found in practically all the important cities.

In 1933 there were consultation centers for expectant mothers in 70 cities of more than 50,000 inhabitants; Berlin alone had 46 centers. Maternity benefits were granted in 85 cities last year; the period for which such aid is granted in most cities (63 per cent) is 10 weeks. There are in Germany 922 infant consultation centers, 83 of which are in Berlin. The total number of individual consultations during 1933 was 197,600.

The foundations of this work go back 25 or 30 years and some of its roots to the social insurance plan of Bismarck in 1882. The Kaiserin Augusta Victoria Haus, established at Charlottenburg in 1909, is the parent institution for the training of physicians and children's nurses in child hygiene. Its archives are the most complete in Germany. It has an unbroken history of productive activity of 25 years and is still the most influential institution for this work. Research is continuing, and publications of results appear regularly.

Point XXI of the Nazi program provides that

> The state must see to raising the standards of health of the nation by protecting mothers and infants, prohibiting child labor, increasing bodily efficiency by obligatory gymnastics and sports laid down by law, and by extensive support of clubs engaged in bodily development of the young.

There is every evidence that the regime intends to strengthen and extend work for mothers and children. While there have been many changes in personnel in hospitals, clinics, institutes, and wel-

fare organizations in Germany, the structure of its maternity and child hygiene work appears to remain intact. Clinics and health centers are running as usual. Maternity benefits are continued, although on a reduced scale.

Italy—The Fascist State has reorganized completely its maternal and child health program. In December, 1925, it created a new organization, the Opera Nazionale per la Protezione della Maternità e dell'Infanzia (National Institution for the Protection of Motherhood and Infancy). Central headquarters were set up in Rome in 1929 to coördinate closely allied activities in the different ministries of the corporative state and to promote active local coöperation in welfare work for mothers and children through Provincial Federations and Committees of Patrons. The purpose of this institution follows the main lines of development of the Fascist State—a highly centralized, comprehensive, or "totalitarian," organization to bring about unity of methods and action among the diversity of forms of welfare work for mothers and children in Italy. Mussolini has taken a personal interest in this institution as it has to do with eugenics, increase of population, hygienic and social protection of the State.

> In order to stamp this national welfare work on behalf of mothers and their little ones with a definite character of its own, the government not only issued regulations, which have been enacted into law, so exact and minute in all particulars as to be termed by the Council of State a complete treatise on the care of mothers and infants, but with significant intention it has devoted the entire revenue from a new tax to supply the necessary funds for the institution; *i.e.*, the tax on bachelors.[1]

The program of the institution provides for the collection of statistical data, the organization of a service for the inspection and supervision of institutions, grants-in-aid to institutions most in need of financial help, direct assistance to mothers and children, antituberculosis prophylaxis, training of specialized staffs for child care, maternal and child health education, reforms of welfare service for foundlings. Maternity and child health centers have been opened in all parts of Italy. Provisions are made to send pre-tuberculous and convalescent children to seaside and mountain resorts.

While there is still a strong tendency to institutionalize and to give clinical treatments, the new institution recognizes the importance of preventive medicine and child care and the responsibility for attention to children in their own homes. There has been improvement of public health nursing since the war, as the result of the establishment of nursing schools on American models shortly after the close of the World War. The recent opening of the new Institute of Hygiene and Public Health in Rome should give added impetus to child welfare work in Italy.

Russia—No account of the provisions for maternal and child welfare in Europe would be complete without mention of the stupendous changes under way for the protection of motherhood and childhood in the Soviet Union. We note the upheaval in thought and action which the Communistic philosophy has wrought in the daily life of women in Russia. Lenin proudly stated,

> We have literally razed to the ground all the foul laws regarding the inequality of women, the obstacles to divorce, the odious formalities connected with it, the refusal to recognize children born out of wedlock, and so on, those laws the survival of which are still often to be found in all civilized countries.[2]

Accordingly, marriage and divorce have been oversimplified, depending entirely upon declaration of purpose. "Illegitimacy" has disappeared both from the Code of Laws and from common parlance.

The rights of children no longer depend upon the form of marriage but

are inherent in blood relationship and in the duty of the state to protect every child and to provide for its education. Both parents are equally responsible for its maintenance, and in case of divorce, alimony can be obtained from the father for its support and education. The mother may declare the paternity of the child even before its birth. The state has taken over very largely the physical and mental care of the child through consultation centers for women and children in connection with obstetrical hospitals and crèches (day nurseries).

The number of cots in crèches in cities and towns increased from 56,921 in 1929 to 365,010 in 1932. A unique feature of the crèche in Russia is its establishment in state and collective farms, and the use of traveling field crèches during harvest seasons. The crèche is taken into the field and the nursing mother at work there can nurse the baby several times a day. The number of cots in permanent crèches on state and collective farms increased from 8,564 in 1929 to 347,617 in 1932, and in temporary crèches on collective farms from 251,400 in 1929 to 4,529,000 in 1932. This enormous expansion has entailed a great deal of readjustment and has made it difficult to secure enough trained workers.

Space forbids the descripton of extensive work for mothers and children which has been developed in Austria, Hungary, Jugoslavia, Czechoslavakia, and Poland under the inspiration and with the material help of the Health Organization of the League of Nations, American Friends Service Committee, American Red Cross, American Relief Administration, Commonwealth Fund, and International Health Division of the Rockefeller Foundation.

SUMMARY

Lessons we may learn from child health conditions in Europe:

1. The bold experimentation in certain phases of maternal and child welfare now proceeding on a nation-wide basis in many European countries challenges our interest and critical study.

2. An amazing fact in Europe today is the foresight and vigor with which governmental schemes for maternal and child health are being pursued. Whatever the form of government, a desperate struggle is on to preserve, strengthen, and extend essential services for the welfare of mothers and children.

3. The recognition that the first duty of the state is to protect its mothers and children and to provide for their welfare through some form of social insurance is one of the strong points in the European system.

4. In countries where maternity and child hygiene technics have been built upon sound scientific principles and tested over considerable periods they are being preserved with but few pattern changes, regardless of economic, social, or political upheavals.

5. The ability to stick to fundamentals and not become enamored of fads, fancies, and frills, which inevitably break down in times of stress, is a distinguishing feature of child health work in Europe.

6. The stability and continuity of the English system of public health commends itself, because it provides for full-time well trained health officers in every locality, whose position is uninfluenced by political or personal prejudices.

7. There is better control of midwifery in European countries than in America. Adequate facilities are afforded all classes of women for prenatal and obstetric service and for maternity benefits.

8. There is a clear recognition of the intimate relationship between housing and child welfare. Definite steps have been taken by governments abroad to wipe out slum areas and to stimulate the building of sanitary houses for the wage earning classes.

9. The development of health centers as community units of coöperative health work, of generalized public health nursing, and of popular health education as found in the United States has not reached the same high level in most European countries. In these technics the United States has contributed materially to health work abroad.

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The Nutritional Aspects of Milk Pasteurization*

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THE evidences of animal experiment do not show any differences between raw and pasteurized milks.

The actual changes in milk caused by pasteurization are an increase in insoluble calcium of about 6 per cent, a reduction of iodine content by 20 per cent, and considerable destruction of vitamin C. Certain animals have a higher need for calcium than do infants and it may be that raw milk would be better for them than pasteurized milk, but there is no evidence that this is true for children. There is no convincing evidence that raw milk, even if it were safe, is superior to pasteurized milk in infant feeding. Pasteurized milk is probably better since it is more easily digested. The growing practice by pediatricians of boiling milk or of feeding evaporated milk to infants, shows that it is certainly satisfactory. The idea of splitting hairs over slight assumed differences is absurd. We should allow a reasonable margin of safety over the minimum nutritive requirements in child feeding, and this is best accomplished by giving a liberal allowance of milk.

The heating of milk is so great a safety factor in preventing disease that there should no longer be any argument about the superiority of raw milk.

We have an immense amount of clinical evidence gathered from many countries which shows that pasteurized milk has fulfilled the needs for feeding infants and children over many years, with no evidence of damage, provided the loss of vitamin C is made good. The opponents of pasteurized milk have conspicuously failed to make a case against it in favor of the raw product. The marked lessening of incidence of intestinal troubles and contagious diseases carried by raw milk through pasteurization makes it hard to understand how opposition can longer be justified.

It is well known that milk is deficient in iron and in ascorbic acid, and perhaps also in copper, although during pasteurization it probably becomes sufficiently enriched in this element. But we no longer judge a food on the basis of what it lacks. We stress the importance and significance for health of making proper combinations of foods so as to secure effective supplemental effects. No baby intelligently managed is now fed milk alone for any considerable period. It is given cod liver oil and fruit juices early, and supplementary foods as it grows. The problems of feeding normal infants are now satisfactorily solved.

The only recent reports of nutrition experiments which show inferiority of sterilized as compared with pasteurized and raw milk are those of E. C. V. Mattick, and J. Golding, in England, who observed that rats fed biscuit made

* To be read before the Food and Nutrition Section of the American Public Health Association at the Sixty-third Annual Meeting in Pasadena, Calif., September 3, 1934.

of white flour and water, supplemented with milk, either raw or pasteurized, grew normally and reproduced normally, whereas those fed the same biscuit supplemented with sterilized milk failed in reproduction, and of the original rats many failed to reach maturity. Their results seem to differentiate markedly between pasteurized and sterilized milks in their nutritive properties, especially in respect to power to support reproduction.

I have never been much impressed by these experiments for they were not planned in a manner to yield information which could be applied to human experience with diet. It is one thing to demonstrate that a simple mixture of biscuit and sterilized milk is less effective nutritionally than the same mixture with raw milk, and another to translate the condemnation of pasteurized milk used in an entirely different manner in the human diet where it is supplemented with foods more effective as sources of nutriments than white bread biscuit. The fact is that even in these English experiments, pasteurized milk was not shown to have undergone any appreciable deterioration, even when tested in so restricted a manner. No effective supplementary foods were studied in combination with the sterilized milk.

The experience of numerous investigators, including the present writer, and covering many years of studies with animals, shows that pasteurized milk, milk powders and evaporated milks, are essentially the equivalents of raw milk in nutrition. The differences between them is not sufficient to warrant serious consideration. Furthermore, the experience of the pediatric profession with sterilized milk has abundantly demonstrated that excellent results can be secured in infant feeding when such milk is properly supplemented with a fruit juice and cod liver oil and the infant receives supplementary feeding with appropriate additions as it advances in age. The safety factor afforded by sterilizing milk as a safeguard against infections is so great that there is no question about the wisdom of this system of feeding.

The Lanarkshire, Scotland, study of 10,000 children receiving three-quarters of a pint each daily—5,000 raw, grade A milk and 5,000 pasteurized milk—with 10,000 as controls, gave clear evidence of the beneficial effect of milk feeding on the rate of growth. There was no difference in the raw and pasteurized milks (*J.A.M.A.*, 96:1243, 1931).

Scheunert and Bischoff (*Biochem. Zeitschr.*, 219:186, 1930) studied the food value of raw and heated milk, and found no detectable change in food value. These experiments furnish cogent evidence that cooking (foods other than milk as well as milk) as ordinarily practised, does not interfere with its usual influence on cell metabolism or prevent its utilization for such characteristic demands as growth and reproduction.

In a letter from Lord Dawson of Penn, to the Editor of the *Lancet*, December 13, 1930 (*A.J.P.H.*, 21:389, 1931), he states that pasteurization of milk should be universally recognized.

The Scottish experiment reported here is commented upon by the Editor of the JOURNAL (*A.J.P.H.*, 19:415, 1919):

> The campaign for the increased use of milk by children and adults is based on sound facts. We still need to push our efforts for clean milk, and we should draw distinction between pasture milk and stall-fed milk, which does not have the same values unless the stall-fed animals are specially dieted.

Fortunately we now have available an excellent study by Leslie C. Frank and others of the U. S. Public Health Service, which should finally silence the critics of pasteurized milk. These

investigators studied children fed raw and heated milk, supplementing the diets ordinarily received by American children in 39 cities and in 10 states. The children to the number of 3,700 were from 10 months to 6 years old. The report states:

> The growth-promoting capacity of heated milk plus the supplementary diet received by the average American child of 10 months to 6 years is not measurably less than the growth-promoting capacity of raw milk plus the supplementary diet received by the average American child of 10 months to 6 years.

Analyzing their data they report that there were 32 cases of diphtheria among 1,875 children who received heated milk only, against 40 among the 1,762 children fed predominantly on raw milk, case rates of 17.1 and 22.7 per 1,000 respectively. For scarlet fever, the group fed heated milk showed 43 cases against 73 for the raw milk group, case rates of 23.0 and 41.4 per 1,000 respectively.

Intestinal disturbances reported, such as diarrhea, dysentery, flux, colitis, and summer complaint, amounted to 426 for the heated milk group against 491 for the raw milk group, case rates of 227.0 and 278.0 per 1,000 respectively. When diarrhea was excluded on the assumption that many mild cases were due to causes other than milk, the incidence of intestinal diseases amounted to 208 for the heated milk group against 395 for the raw milk group, case rates of 111.0 and 196.0 per 1,000 respectively. Fifty-nine cases of rickets were diagnosed in the heated milk group against 90 cases in the raw milk group, case rates of 31.5 as against 51.1 per 1,000. The results as they relate to rickets are accounted for by the observation that more of the heated milk-fed children were given cod liver oil than was the case of those fed raw milk. Of the heated milk-fed children 41.6 per cent were given some cod liver oil as against 27.6 per cent of those fed raw milk. The average weight of the children in the two groups was 33.6 and 33.2 lb. respectively for those fed heated and raw milk. There were no significant differences in the heights of the children of the two groups, *i.e.*, 37.5 and 37.4 respectively. The report shows a significantly higher incidence of diphtheria, scarlet fever, and intestinal disturbances. The report does not consider tuberculosis, but there is strong evidence that this disease has a lower incidence in cities where almost all the milk is pasteurized.

Since the effect of pasteurization on the food value of milk is too slight to be apparent even in specially designed experiments, and is not apparent in observations on children living under ordinary American conditions, there is no valid argument which can be brought forward in support of the marketing of raw milk for the general population. It is granted that certified milk is as safe as any ordinary foods, but if the optimum amount of milk is to be consumed by the public the price must be made as low as is consistent with the maintenance of high quality. The only method of accomplishing this objective, which has the full approval of public health officials and bacteriologists, is pasteurization of the milk supply.

It seems strange indeed that, when we accept so generally the cooking of most of our foods, there should still remain in certain areas a serious objection to the milk heat treatment of milk involved in pasteurization. The menace of bovine tuberculosis to the health of children is so great that universal pasteurization would be imperative if only for the prevention of the spread of this disease alone among children.

Studies in Ventilation

I. Skin Temperature as Related to Atmospheric Temperature and Humidity

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IT was desired to secure data on the relation between skin temperature and atmospheric temperature and humidity under ordinary conditions in a steam heated office with window ventilation. In lieu therefore of good experimental control of the extraneous variables, it was necessary to secure a sufficient volume of data to have statistical value.

The skin temperature determinations were made upon three female subjects engaged in routine office activities. Three measurements, one on each cheek and one on the forehead, were made at approximately the same times each day, namely, at the beginning, middle, and toward the end of both morning and afternoon periods. During Period I, March 24 to May 2, 1933, windows were closed for the most part and the office was heated; while during Period II, May 3 to June 30, windows were generally open and there was little use of artificial heat. Wet and dry bulb temperatures and Kata thermometer readings were likewise recorded with each set of measurements of skin temperature.

METHOD OF SKIN TEMPERATURE DETERMINATION

The skin temperatures were measured by means of a thermocouple system designed upon the following considerations. In any metal system in contact with the skin and with the adjacent cooler air there is a flow of heat and hence a temperature gradient. The equilibrium temperature at any point in the metal is therefore somewhat lower than the true temperature of the surface of the skin, and this deviation constitutes an error in the determination of skin temperature.

This principle and the extent of the error in a typical system is illustrated in the following experimental data. A piece of copper wire, diameter d, was bent to form a right angle, one side of which, the contact arm, 2 cm. in length, was held against the skin, the other, the lead-off arm, L, rising perpendicularly in the air. A junction of fine constantan wire, 0.1 mm., was soldered to the lower side of the contact arm, at its mid-point, so that it pressed upon the skin. A second junction was soldered on the arm L at varying distances, x, above the angle (Table A).

The differences in temperature between the two junctions under various conditions were found to be as shown in Table A.

Accepting these differences as a first approximation to the true error of an actual skin temperature measurement made at point x we note:

1. With a long (5 cm.) lead-off arm, the error increases inversely as the diameter of the wire (I-4, II-3, V-1).
2. The error increases with air movement (I, V).
3. The error increases with the distance from the skin (x) (I-IV).

TABLE A

TEMPERATURE DIFFERENCES BETWEEN JUNCTIONS
(Air Temperature 20° C.)

Wire Diam. mm. (d)	*L cm.*	*x cm.*	*Air Movement (ft. per min.)* 25	100	*Exp. No.*
1.45	5	2.0	0.75	1.50	I 1
		1.5	0.50	0.95	2
		1.0	0.50	0.55	3
		0.5	0.25	0.40	4
	0	0.15	——	0.25	5
1.0	5	2.0	2.0		II 1
		1.0	1.5		2
		0.5	1.0		3
		0.25	0.5		4
1.0	2.5	2.0	0.75		III 1
		1.0	0.65		2
		0.5	0.50		3
		0.25	0.40		4
1.0	1.0	0.5	0.50		IV 1
		0.25	<0.05		2
0.4	5.0	0.5	1.75		V 1
	3.0	0.5	1.50		2
	2.0	0.5	1.25		3
	1.0	0.5	0.50		4
	0.5	0.5	<0.05	1.0	5
	0.3	0.3	0.0	0.4	6
	0.2	0.2	0.0	0.1	7
	0.0*	0.0	0.0	0.0	8

L = total length of lead-off arm
x = distance, on L, between skin and second junction
* L replaced by 3 ft. silk covered copper wire, 0.07 mm. diameter

4. With constant distance from the skin, the error increases with the length of the lead-off wire (II-III, V).

5. With contact wire of 0.4 mm. diameter and 2 cm. long the error is negligible in still air with the outer junction at the end of the lead-off arm 5 mm. from the skin, and in air at 100 ft. velocity it is 0.1° at 2 mm. from the skin.

6. A lead-off system of silk-covered magnet wire (diameter 0.07 mm.) provides no appreciable cooling of the contact arm.

It remains to be shown to what extent the contact arm itself, at least half the surface of which is exposed to the air, departs from the skin temperature. A sheet of copper 1 cm. thick, placed over the skin, would pass the normal heat loss with a temperature gradient of about 0.1° between its two sides. Its mean temperature, however, would be determined by the relative thermal conductivities of the skin-copper and the copper-air contacts.

The following experiment gives an indication of the true relation. Two contact pieces were prepared, each 2 cm. long with a constantan junction at its mid-point. They were connected by a fine insulated magnet wire. One piece was pressed onto a piece of filter paper coated with glue, and when dry the paper was trimmed to about twice the width of the wire. The paper in

turn was moistened with glue and coated with a layer of fine asbestos fibre. In this way the upper surface of the wire was partially insulated against the air. This wire was placed on the skin side by side with a similar bare wire. No temperature difference was noted in still air. In air at 100 ft. per minute the protected wire was about 0.05° *cooler*, during several trials at different spots. The solid insulating material paper, asbestos and glue, with its increased and rough surface was evidently a slightly better heat diffuser than the bare wire alone.

It is evident that a bare copper wire of 0.4 mm. diameter pressed against the skin will assume a temperature very close to the actual skin temperature, even in an air current of 100 ft. per minute, if there be no extension of the wire not in skin contact except a copper lead-off 0.07 mm. in diameter. We have also noted that wire of this diameter, 0.4 mm. gives a constant reading as between a very light contact or a maximum pressure against the skin, whereas the readings of a heavier wire, 1.4 mm., vary with the pressure.

The results of these studies have been incorporated in a system which is shown in the accompanying sketch (B). The framework is of spring brass wire carrying between the two lower loops a piece of copper wire 0.4 mm. in diameter and about 1 cm. in length which is held to the frame and insulated from it by silk threads. This copper wire constitutes the contact or collecting system.

The junction itself is soldered to this collector at its mid-point and consists of a wire of constantan 0.1 mm. in diameter and one of silk-wrapped cop-

FIGURES A AND B

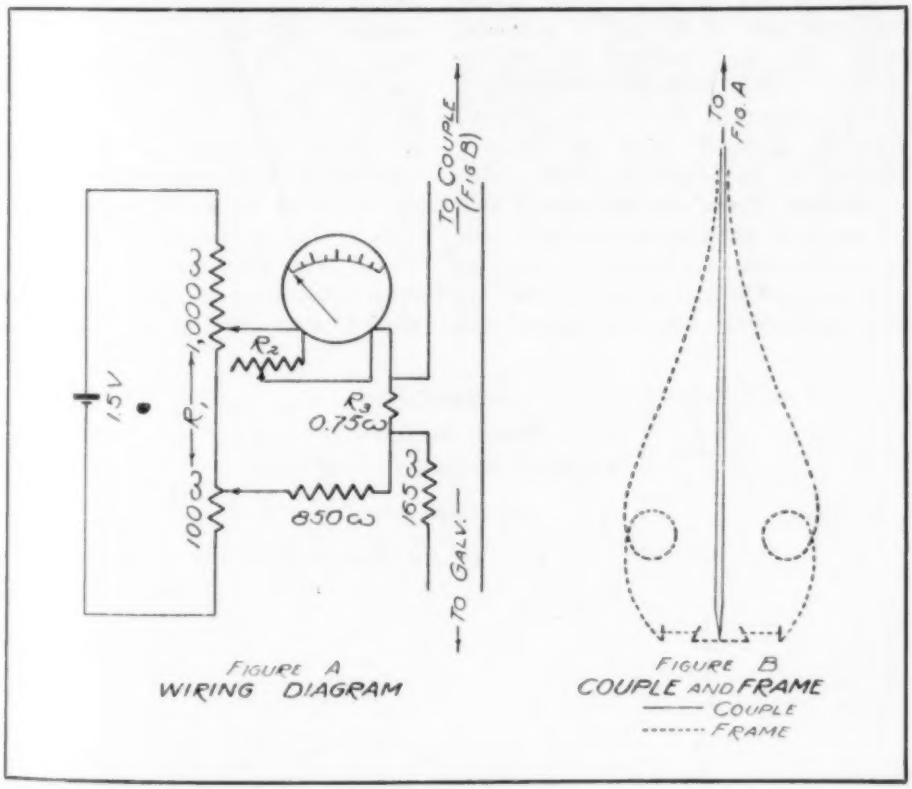

FIGURE A
WIRING DIAGRAM

FIGURE B
COUPLE AND FRAME
—— COUPLE
····· FRAME

TABLE I

I PERIOD—ALL SUBJECTS

Air Temperature and Humidity

Air Temperature F.	*Relative Humidity (Per Cent)*										
	10–14	15–19	20–24	25–29	30–34	35–39	40–44	45–49	50–54	55–59	
69			6	10	3	5		3		3	30
70–71	3	15	6	20	14	3	3	3	3	3	73
72–73	3	16	27		5	20	6	2	6	5	90
74–75	7	14	6	2	6	6		3	3		47
76–77				1		3		8	3		15
78–79								8			8
	13	45	45	33	28	37	9	27	15	11	263

per 0.07 mm. in diameter. We have shown that this design provides a sufficient protection against the commonly observed deficiency of the thermocouple in this application, namely, that it gives low results especially in moving air. It also avoids the other just criticism of thermocouples of the earlier type in which, in order to avoid thermal losses through the metal system, a considerable area of the skin is protected from the air, Bedford & Warner (1934). This obviously introduces a positive error in the skin temperature reading, especially when the latter is affected by air movement. One further advantage of the collector wire is that it serves to integrate temperatures over a considerable area instead of recording the temperatures at a single point. In our experiments two junctions of this sort were connected in series for the purpose of covering a still greater area of the skin and also of increasing the sensitivity of the recording apparatus.

The leads from these two junctions were 4 ft. long and were carried to corresponding cold junctions sealed in a water-proof jacket and immersed in water in a thermos bottle, the temperature of which was read at the time of making observations. This thermos bottle was held in one hand and the hot junction system in the other, the whole being connected to the galvanometer system through 50 ft. of duplex wire. This enabled the operator to move about the room and make tests upon the subjects as they were seated at their work. The E.M.F. developed at the junction upon application to the skin was applied to a sensitive galvanometer of 35

TABLE II

I PERIOD—ALL SUBJECTS

Skin Temperature and Air Temperature

Air Temperature F.	*Skin Temperature C.*										
	30.9	31.0–31.4	31.5–31.9	32.0–32.4	32.5–32.9	33.0–33.4	33.5–33.9	34.0–34.4	34.5–34.9	35.0–35.4	
69	1	2	2	6	7	10	2				30
70–71		1	7	14	15	21	14		1		73
72–73		1	2	2	17	33	22	12		1	90
74–75			1		4	12	14	11	4	1	47
76–77					1	2	2	8	2		15
78–79							3	3	2		8
	1	4	12	22	44	78	57	34	9	2	263

TABLE III

I PERIOD—ALL SUBJECTS

Skin Temperature and Humidity

Relative Humidity Per Cent	*Skin Temperature C.* 30.9	31.0–31.4	31.5–31.9	32.0–32.4	32.5–32.9	33.0–33.4	33.5–33.9	34.0–34.4	34.5–34.9	35.0–35.4	35.5–35.9	
10–14			3	2	3	4	1					13
15–19		1	3	8	6	12	2	9	2	2		45
20–24			1	3	9	15	9	5	3			45
25–29	1	2	3	5	4	8	10					33
30–34				1	8	8	11					28
35–39				1	8	13	12	3				37
40–44			2	1	2	4						9
45–49		1		1	3	2	5	11	4			27
50–54					1	6	3	5				15
55–59						6	4	1				11
	1	4	12	22	44	78	57	34	9	2		263

ohms internal resistance, critical damping resistance 200 ohms total, and was balanced to a zero reading by a device which we have modified slightly from sketches kindly shown us by Dr. Swartzchild of the Beth Israel Hospital, New York City, and which have proved of the greatest practical convenience.

In this apparatus, Figure A, a balancing E.M.F. is produced across the resistance R_3. All variable thermo-electric effects are contained in the high potential circuits, the galvanometer circuit including merely the resistance R_3, of 0.75 ohms, and a damping resistance of 165 ohms, both of manganin. The milli-ammeter has a range of 1.5 m.a. It is calibrated to read directly in degrees by establishing a known temperature difference between the hot junction in an oil bath and cold junction in its thermos bottle, and setting the resistances R_1 and R_2 so that the milli-ammeter reading corresponds to this difference on a scale of 1 m.a. $= 10°$. Thereafter, R_2 remains fixed and the E.M.F. across R_3 is proportional to the current. Since the thermo-electric

TABLE IV

II PERIOD—ALL SUBJECTS

Air Temperature and Humidity

Air Temperature F.	*Relative Humidity (Per Cent)* 10–14	15–19	20–24	25–29	30–34	35–39	40–44	45–49	50–54	55–59	60–64	65–69	
69			6	2	6	2	2	6					24
70–71			3	18	6	7	4			6			44
72–73			5	18	13	9	2	3	2	3			55
74–75		5	5	12	9	6	10	2	3	9	4		65
76–77		2		18	3		15	2	10	7			57
78–79		4			13	5			6	16	4		48
80–81				2		3	7		3	2	2	2	21
82–83					5			4			2		11
84–85								2		8	2	2	14
86–87								7		8	4	2	21
88–89								6	4	2			12
90–91									3	4			7
	11	19	70	55	32	40	32	31	65	18	6		379

TABLE V

II PERIOD—ALL SUBJECTS

Skin Temperature and Humidity

Relative Humidity Per Cent	*Skin Temperature C.*											
	31.0–31.4	31.5–31.9	32.0–32.4	32.5–32.9	33.0–33.4	33.5–33.9	34.0–34.4	34.5–34.9	35.0–35.4	35.5–35.9	36.0–36.4	
15–19						2	4	5				11
20–24			1	1	3	11	2	1				19
25–29		1	3	4	14	17	16	9	6			70
30–34			3	4	3	9	20	10	4	2		55
35–39	5	2	2	3	2	3	6	8	1			32
40–44					9	9	12	9	1			40
45–49			2	4	1	4	5	5	6	5		32
50–54				1	3	5	9	10	1	2		31
55–59				7	5	8	11	11	12	9	2	65
60–64					2	2	1	3	7	3		18
65–69								2	2	2		6
	5	3	11	24	42	70	86	73	40	23	2	371

E.M.F. is proportional to the temperature difference, the milli-ammeter calibration should hold over its range. This was actually found to be the case in several thorough calibrations over the range of the instrument. The control resistance R_1 consists of two potentiometers of 1,000 and 100 ohms respectively, giving a coarse and a fine control of the current.

Equilibrium was reached in about 10 seconds after application to the skin, and readings were generally completed after 20 seconds, temperature being recorded to the nearest 0.1° C.

THE DATA

The detailed protocols are voluminous in their original form but can be satisfactorily summarized, as they were for our formal analysis, in the form of three classified correlation tables for each period, which are here presented, Tables I–VI. Skin temperatures, read to 0.1° C., were grouped in 0.5° classes, air temperatures, to 1° F. were grouped in 2° classes, and relative humidities, to 1 per cent were grouped in 5 per cent classes. Tables of this sort were prepared for each of the three individual subjects as well as for the group. The various characteristics of the distributions and their correlation coefficients are summarized in Tables VII and VIII, in which subscripts s, h, and t refer to the skin temperature, relative humidity and air temperature respectively, the former being expressed in C. degrees, the humidity in per cent of saturation, and the air temperature in F. degrees. M, with appropriate subscript, refers to the mean values, σ to the standard deviations from the mean, $r_{st.h}$ to the partial correlation coefficient between skin and air temperature freed from the effect of humidity, $r_{sh.t}$ to the partial correlation coefficient between skin and humidity freed from the effect of temperature and the b's to the corresponding partial coefficients of regression in the final regression equation.

Some individual differences will be noted as would be expected. In the essential details however the values for each period are sufficiently alike to justify treating the combined data as homogeneous and deriving the corresponding analytical equations from them. The standard deviations of the

TABLE VI

II PERIOD—ALL SUBJECTS

Skin Temperature and Air Temperature

Air Temperature F.	Skin Temperature C. 31.0–31.4	31.5–31.9	32.0–32.4	32.5–32.9	33.0–33.4	33.5–33.9	34.0–34.4	34.5–34.9	35.0–35.4	35.5–35.9	36.0–36.4	
69	2		4	8	4	6						24
70–71	3		4	8	13	11	4	1				44
72–73		2	1	5	9	24	11	3				55
74–75		1	2	3	14	12	22	11				65
76–77					1	9	24	14	8	1		57
78–79					1	5	18	18	3	3		48
80–81						2	3	12	4			21
82–83							1	4	4	2		11
84–85						1	1	2	6	4		14
86–87							1	4	10	4	2	21
88–89							1	1	3	7		12
90–91								3	2	2		7
	5	3	11	24	42	70	86	73	40	23	2	379

correlation and regression coefficients given are tests of the validity of the correlations instead of the usual tests of the numerical accuracy; that is, they are computed upon the assumption of zero correlations. In making comparisons in the text the more usual form of the standard deviations are employed.

DISCUSSION

The coefficients of the temperature terms 0.17 and 0.14 respectively with standard deviations of 0.017 and 0.007 respectively, have a difference 0.03 ± 0.02. We may safely consolidate these two into a single coefficient with a weighted mean value of 0.15. Within the range of these experiments, of ordinary indoor office conditions during the winter, spring, and early summer, the skin temperature of the face varied with the room temperature at a rate of about 0.15° C. per degree F. or 0.27° C. per degree centigrade. Since the difference between skin and air temperature represents the gradient through which the sensible heat component of the total heat loss must pass, and likewise measures approximately the radiation gradient, this result indicates a decrease in the heat loss by conduction, convection and radiation, and a corresponding increase in the latent heat of evaporation at a rate which in the mean range tends to shift about 3 per cent of the convective loss over to evaporative loss for a change in air temperature of 1° F.

This result is in harmony with the data of Benedict and Root (1926) showing a progressive change in insensible heat loss with changing metabolism and consequent higher skin temperature. We compute approximately from the earlier work of Benedict and Carpenter (1910) that a change in metabolism which would raise the skin temperature 0.15° C. shifts about 1 per cent of the convective loss to latent heat loss. Our results indicate a decidedly greater transfer of the cooling burden to evaporation when the skin temperature is forced upward by increasing air temperature than is the case with increasing metabolism. We note with interest also that if our equation be projected to a room temperature of 37° C., the skin temperature becomes 37°, and the shift to latent heat loss is complete.

TABLE VII

PERIOD I

Summary

	Subject				
	A	*B*	*C*	*All*	*S.D. (all)*
N	94	93	76	263	
M_s	33.1	33.3	33.2	33.2	
M_t	72.4	72.3	72.1	72.3	
M_h	31	31	31	31	
σ_s	0.73	0.77	0.81	0.78	
σ_t	2.38	2.38	2.34	2.36	
σ_h	12.6	12.4	12.5	12.5	
r_{st}	0.48	0.61	0.56	0.53	
r_{sh}	0.18	0.21	0.32	0.22	
r_{th}	0.13	0.15	0.17	0.15	
$r_{st.h}$	0.47	0.60	0.55	0.52	0.06
$r_{sh.t}$	0.14	0.15	0.28	0.17	0.06
$b_{st.h}$	0.14	0.19	0.18	0.17	0.02
$b_{sh.t}$	0.006	0.008	0.014	0.01	0.004

$$S = 33.6 + .17(T - 74) + .01(H - 36)$$

Because they touch upon a subject which has been discussed from various angles, theoretical and experimental, and with somewhat varying data and conclusions, the coefficients of the humidity terms are of considerable interest. It is often stated as an accepted fact that evaporation, and the consequent cooling of the body, is lessened with increasing atmospheric humidities. It is true that evaporation from a surface continuously moist, *i.e.*, a free water surface, is a variable quantity depending primarily upon the temperature, relative humidity, and movement of the atmosphere. On the other hand,

TABLE VIII

PERIOD II

Summary

	Subject				
	A	*B*	*C*	*All*	*S.D. (all)*
N	157	147	75	379	
M_s	34.1	34.2	34.0	34.1	
M_t	76.9	76.8	75.2	76.5	
M_h	41	42	37	41	
σ_s	0.94	0.92	0.97	0.94	
σ_t	5.6	5.7	4.2	5.5	
σ_h	13.3	13.1	12.5	13.1	
r_{st}	0.75	0.75	0.70	0.74	
r_{sh}	0.32	0.36	0.09	0.29	
r_{th}	0.53	0.55	0.28	0.51	
$r_{st.h}$	0.73	0.71	0.70	0.72	.05
$r_{sh.t}$	—0.14	—0.10	—0.15	—0.14	.05
$b_{st.h}$	0.14	0.13	0.17	0.14	.01
$b_{sh.t}$	—0.008	—0.006	—0.009	—0.008	.003

$$S = 33.8 + .14(T - 74) - .01(H - 36)$$

if the amount of moisture is limited and controlled by agencies independent of any specified atmospheric property, such as humidity, then the evaporation, and the resultant cooling, are similarly independent.

An example of the first sort is the lining tissue of the respiratory tract; especially the lungs. It will be of interest to determine roughly the influence of variations in atmospheric humidity upon this value. We may take the following hypothetical case.

Lung ventilation	8 liters per minute
Room temperature	20°
Expired air	Saturated at 34° C.

The moisture required to saturate the inspired air, if it be dry, is 38 mg. per liter or 304 mg. per minute. This represents a latent heat of evaporation at 34° of 10.2 Cal. per hour. But if the air be saturated at 20° it will take up 168 mg. per min., equivalent to 5.7 Cal. per hr. The hourly loss of heat by evaporation from the lungs varies therefore at a rate of about 0.045 Cal. for each change of 1 per cent in relative humidity. For a metabolism of 75 Cal. per hour the variation with humidity may therefore be placed at about 0.06 per cent of the total.

If the difference between skin temperature and air temperature represents the gradient through which about 75 per cent of the total heat is passing, a change of 0.06 per cent of the total value would produce a corresponding relative change in the gradient.

The mean skin-air gradient in our series is 10.8° C. Changing this gradient in the ratio of 75 to 75.06 would result in a change of .0086 as against the value of .01 ± .004. In short, the effect of humidity indicated in the formula is readily ascribable to the change in evaporation from the lungs.

Evaporation from the skin is limited to the output of water. The output is restricted either to a definite quantity, independent of the evaporating conditions of the air; or by having to diffuse through a membrane in which case the evaporation, while not from a free water surface, may nevertheless be similarly dependent upon the drying power of the air.

The testimony of physiologists on this point is varied. Various authorities (*e.g.* Hancock, Whitehouse and Haldane (1930)), believe that the so-called "insensible perspiration" is chiefly water diffusing by osmosis through the skin and is not the product of the sweat glands. Such diffusion might be accelerated by increased drying on the surface. It would surely cease if the surface became saturated. Vasti (1932) postulates a hydrate compound losing water to the air and absorbing it from the deeper layers.

On the other hand Benedict and Root (1926) show excellent experimental data in support of their thesis that the insensible loss is a definite linear function of the total metabolism over a wide range.

This subject has been satisfactorily discussed by Miura (1931). He states that the consensus of opinion among European physiologists is to the effect that the skin temperature and the sensations of comfort, especially throughout the moderate ranges of humidity found under indoor winter conditions, are essentially independent of the relative humidity. American physiologists on the other hand have tended to follow the suggestions of Houghton, Yaglou and McConnell (1923) of the research laboratories of the ASHVE whose well known chart of effective temperatures assigns a very definite place to relative humidity in the determination of comfort and of the sensation of warmth under indoor winter conditions in the home and office. Miura himself, on the basis of

a most carefully controlled series of experiments, concludes that a difference of 50 per cent in relative humidity results in a change in skin temperature of the face of subjects resting, normally clothed, of approximately 0.25° C. in the same direction, corresponding to a coefficient in the humidity term of our equation of + 0.005. This is exactly one-half the value which we have found, is somewhat less than the value we estimate as the effect of evaporation from the lungs and, if Miura's results are about the same order of reliability as our own, both series cluster about the computed lung effect within their probable errors.

As a more critical test of the direct relation between skin temperature and atmospheric humidity uncomplicated by secondary reactions and variables we have made a brief series of tests as follows.

A small quantity of air was blown from a 4" funnel upon the forehead at so slight a velocity that it could not be detected unless the forehead was moist. The air was passed alternatively through a can containing calcium chloride or a similar can containing water. Relative humidity varied roughly from 25 per cent on the dry side to 75 per cent on the wet. Temperature was equalized after drying or wetting by passing through a worm in a water tank.

The subject was seated and two thermo-electric junctions, in series, were fastened over his forehead. These were then exposed alternately to the moist and the dry air. The air current alone produced a slight cooling as compared with still air conditions, but in no case among six experimental subjects was there anything more than a temporary drift of the skin temperature when the air supply was changed, and this returned within a minute or two to the initial point. The apparatus and galvanometer used gave readings sensitive to 0.025°.

From various investigations of the water loss, sensible and insensible, from the skin, and also from studies of skin temperature it appears that the important function of skin cooling by evaporation from the forehead and cheeks is, within normal ranges of both temperature and humidity, independent of the relative humidity of the air but that there is a minor secondary effect of relative humidity upon the forehead and cheek temperature due to the varying rate of evaporation from the respiratory tract.

The open air conditions which prevailed during a considerable portion of our second period were evidently largely responsible for masking a similar result in this series. These conditions differ markedly from those in Period I in that the humidity is rather highly correlated with the temperature ($R = 0.51$ as against 0.15 in Period I). The days of higher temperatures and higher humidities were largely days of open window ventilation with increased air movement and consequent relatively lower skin temperatures. In view of the small magnitude of the humidity coefficients in either series and their exact neutralization if the two series be combined it is easier to understand the fairly unanimous conclusion of European physiologists than it is to understand the common acceptance of the view that increased humidity makes for decreased cooling by evaporation.

For the purposes of comparison we consolidate our two equations, eliminating the humidity terms as of no practical significance, and transform air temperature to the centigrade scale, with 20° as standard. This gives

$$S = 32.8 + .27(T - 20)$$

We may now compare our values of the two constants with those from other sources (see next page).

Winslow and Greenburg (1932) recorded 26 sets of observations upon

SUMMARY OF CONSTANTS IN THE EQUATION $S = a + b(T - 20)$

	a		b		Temperature range
Present study, face	32.8 ± .03 *		.27 ± .02		20 — 27
Winslow and Greenburg					
Nude body	29.9	.6	.61	.14	8 — 29
Face of nude body	31.1		.41	.09	8 — 29
Bedford and Warner, face	34.9	.09	.35	.03	15 — 23
Ward, face	32.8	.11	.24	.01	15 — 30
Reichenbach and Haymann, forehead	31.8	.3	.31	.03	15 — 30
Vincent	——	—	.3		— —

* The standard deviation at the mean temperature of the study, not necessarily at 20° to which the constant is referred.

selected spots of the nude body under a wide range of air conditions from which we compute the constants for the nude body. They also show the relation between mean temperatures of the various parts of the body, permitting separate computation for the forehead and cheeks. Bedford and Warner (1934) give the results of 415 observations over a considerable temperature range for bodies normally clothed. Reichenbach and Haymann's (1907) experiments upon 2 subjects have been recomputed in the range 16.5°–28.8°. They also quote a series by Vincent (1890). Ward (1930) has reported a study comparing 81 sets of measurements upon 4 subjects from which we have computed the constants for forehead plus 2 cheek values together. The indicated accuracy is fully justified in view of the careful technic employed.

THE EFFECTIVE TEMPERATURE SCALE

In view of these results and especially of the slight effect of humidity upon the skin temperature, it will be of interest to investigate some of the data from the point of view of the so-called effective temperature in the range in which we are interested. The effective temperature chart is so constructed that a dry bulb temperature of 70° at 50 per cent humidity designates the same effective temperature as a dry bulb of 75° at zero humidity. In this region, therefore, if skin temperature is to follow effective temperature, the humidity coefficient must be one-tenth of the temperature coefficient in equations of the type of those we have used. This would allow about 50 per cent greater influence to humidity than is indicated in our first period equation, about twice as great an influence as we compute from the lung evaporation alone and about three times the value found by Miura (1931), a point which the latter noted. All these values however are well within the probable errors of data compiled from a short series of studies. In Winslow and Greenburg's (1932) series of 26 observations, for example, we compute a humidity coefficient of $+ 0.02 \pm .04$. It is not surprising therefore that when any given series of skin temperature data are correlated with air temperature it makes little difference whether the humidity factor is included, as effective temperature, or excluded. We have computed such correlation coefficients using the data of our two periods separately and have also made a similar computation with the data of Winslow and Greenburg (1932), which they plot to show an excellent linear relation with effective temperature. Results by the two methods of computation are identical (p. 970).

SUMMARY AND CONCLUSIONS

Skin temperatures of the cheeks and forehead were determined upon 3 female subjects engaged in office work

	Correlation Coefficient r		
	Skin Temperature Against		
	Air Temperature	*Effective Temperature*	S.D.
Present Study			
I	.53	.51	± .05
II	.74	.72	.04
Winslow and Greenburg	.93	.92	.03

in a steam-heated, window ventilated office during the winter, spring, and early summer of 1933. Readings were made five or six times a day together with wet and dry bulb temperature reading in the office.

A statistical analysis of the data indicates:

1. A positive correlation between skin temperature and room humidity during the closed window seasons which is wholly ascribable to evaporation from the respiratory tract and which is so small as to be readily reversed by the slight effect of freer ventilation in the open window season.

2. A positive correlation with air temperature, indicating a rise in skin temperature of 0.14°C. per degree F. in room temperature (0.27° C. per degree centigrade) and a corresponding shift of 3 per cent of the total heat loss from radiation and convection to latent heat of evaporation. Similar coefficients, reported by or computed from the work of other investigators are shown for comparison.

3. The effective temperature scale, while admirably suited to comparisons in the higher temperature range of industrial conditions overestimates the relation of humidity to skin temperature in the range of ordinary office conditions in the winter.

Finally it remains to be pointed out that the sense of comfort as expressed in "comfort votes" and as felt by the individual, is largely determined, and can be objectively measured, by the skin temperature, possibly with the aid of some measure of the internal gradients as suggested by Bazett and McGlone (1927). The latter factor is clearly in evidence during rapid readjustment to changed conditions, but under equilibrium conditions we find Ward's (1930) data especially significant. The comfort votes of 4 individuals were correlated with forehead temperature by coefficients (r) of from .80 to .96, or for the group .88.

In the further search for those evasive combinations of environmental characteristics, which are found to make for a sense of comfort, we believe that progress depends upon recognition of the fact that the body comes fairly quickly into quantitative thermal equilibrium with any environment that is not too extreme, but that large and significant shifts in the qualitative manner of heat loss are often brought about by apparently minor changes in the environment.

It follows therefore that the "cooling power" of the air as indicated by charts of "equivalent" conditions, or by any of the various instruments which integrate the effects of two or more air properties, is not a criterion of that qualitative distribution of the manner of cooling which alone, rather than the fairly constant total rate of cooling, appears to affect comfort.

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Storage Battery Plants, New York State, 1933

J. D. HACKETT

Prepared by Division of Industrial Hygiene, New York State Department of Labor, Albany, N. Y.

FOR the past several years an effort has been made to record the incidence of sickness due to lead poisoning on a *rate* basis. The object of this is to compare the rates of one factory with another, of one year with another, and the collective rate with that of others outside of state. The results for 1933 are now on record and, as will be seen by the table, there is a slight improvement over 1932.

There is a lead poisoning frequency rate of 9.25 as compared with 10.56, and a severity rate of 0.52 as compared with 0.58 for 1932. These figures, representing average practice, divide the factories of the state into two classes, those above and those below average. Hence, those needing to take additional preventive measures are indicated clearly.

The small plants have a distinctly high rate and it is certain that the figures indicate that preventive measures if adopted are not thoroughly effective.

The figures submitted indicate the minimum incidence of lead poisoning; there may be unsuspected, unreported, or inconclusive cases, since the facts are obtained by correspondence and not by an independent investigator. For instance, in one case a claim is made for death due to lead poisoning on behalf of a deceased worker and this is denied by the employer. The case, being still in dispute, no figures appear. This indicates a limitation in the use of severity rates applied to occupational poisons, since the time lost may not be included in the period in which it occurs. But a subsequent correction is possible.

Although New York State as a whole shows an improvement, its figures compare very unfavorably with those of lead battery manufacturers outside the state. Certain plants outside the state, working more than twice the time, have one-third of the hours lost and a considerably lower relative frequency and severity rate. These figures indicate a high standard of hygiene practice and the need for more vigorous measures of prevention against lead poisoning in the various plants of New York State.

LEAD POISONING—STORAGE BATTERY FACTORIES

	New York		*Outside the State*
	1932	*1933*	*1933*
Total man hours worked	852,950	1,188,281	2,579,672
Total hours lost due to lead poisoning	4,936	5,647	1,864
Total number of cases		11	5
Frequency rate	10.56	9.25	1.94
Severity rate	0.58	0.52	0.09

EDITORIAL SECTION

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DENTAL CARIES [1]

SOME of the most common ills to which man is heir are the least understood and the most refractory to control. The outstanding instances are the common cold and dental caries. In spite of the fact that large sums of money have been spent on research, and that capable clinicians, laboratory workers, and dietitians have been studying dental caries for years, it must be said that we are far from knowing its cause, and this means that we do not know the prevention. In spite of tooth brush drills, lectures on cleanliness, and cocksure statements that a clean tooth never decays, caries still afflicts the great majority of people.

While no one would advocate deliberately putting children on deficiency diets with the object of producing caries, we have in the various strata of our society many thousands of cases in which diets are deficient and which have furnished some evidence, though there is no record of just what many of these people have eaten or for how long. The majority of experiments have been carried out on dogs and rats, neither of which have teeth comparable in shape or arrangement to those of man. It is also evident that many of those writing on the subject have had inadequate knowledge as well as poor laboratory facilities, and many alleged experiments have not been continued for a sufficient length of time to be of value.

Some regard susceptibility to caries as being due to causes lying within the tooth itself, considering that the bacteria of the mouth and other local factors are of minor importance as compared with a well balanced diet. Some hold that balanced diets act in the prevention of caries by improving the general resistance of the body tissues. Others hold that the teeth are akin to bone in many respects and that prevention of caries may be attained by measures which insure the normal metabolism of calcium and phosphorus, one observer even assuming the existence of dental lymph circulation which concentrates, then carries, the acid-neutralizing properties of the blood to the surface of the enamel. Still others

believe that maintenance of the normal concentrations of phosphorus in the blood is the goal to be aimed at. Adequate supplies of vitamins A, C, and D have all been considered important in the development of teeth and the maintenance of their health. One of the most recent pieces of work indicates that vitamin D is the "most important single corrective factor."

Apart from actual injury by mechanical means, most students believe that tooth decay is brought about by action of acid formed by fermentation of carbohydrates on the enamel, leading to exposure of the underlying structures. This idea was advocated at least as far back as 1840, and there are many strong supporters of it today. At the School of Dentistry of the University of Michigan, Hadley and Bunting, after a prolonged series of studies running as high as 1½ years, advocate this view and believe that the chief organism in bringing this about is the *Bacillus acidophilus,* which has the power of fermenting carbohydrates and can live in concentrations of acid of a pH as low as 3.2. In England, Sim Wallace is the chief advocate of carbohydrate fermentation as a cause of caries, though he has not so far identified any particular germ with the process.

The studies of Hadley and Bunting show that in persons with active tooth decay, the *B. acidophilus* is usually present, and that the numbers of these organisms in the saliva are directly related to the degree of susceptibility of the individual. They have studied groups which they classify as "immunes," "caries-inactive," "developing inactivity," "developing activity," and "constant activity," for periods lasting from 27 days to 1½ years, and hold that there is a distinct relation between the number of *B. acidophilus* present per c.c. of saliva and the activity of caries. Occasionally positive results were obtained on salivas from "immunes" and "caries-inactive" persons, and negative results from susceptibles and those developing susceptibility. "The general bacteriological picture, however, is radically different, both qualitatively and quantitatively, for those representing the above noted extremes in caries activity." Their experience has satisfied them that in 85 per cent or more of the cases studied, the clinical findings are correlated very closely with the bacteriological picture. They have demonstrated that caries was produced in children on diets generally recognized as satisfactory for growth and well-being. Not only were careful records of the daily food intake kept, but analyses of the blood serum, studies of calcium and phosphorus retention, and medical observations all indicated that the metabolic processes were normal. Their appetites remained good, gains in height and weight and general behavior showed them to be normal.

There are a number of studies which indicate that the physical consistency of the foods is of greater importance in producing caries than the chemical composition. When rats were fed rice or corn coarsely ground, no caries resulted, but when mixed with the finer portions, caries resulted invariably. Bunting feels sure that the feeding of sweets, providing an extra caloric intake, is often the determining factor in producing caries in children on adequate diets. In an orphanage with inmates running from 6 to 18 years of age and in which the diet had been definitely deficient for 6 or 7 years, caries was inactive in 57.1 per cent of 49 children over a period of 2½ to 4½ years, and in 71.5 per cent of 109 children over a period of 1½ years. The great majority had cavities on admission and 40 per cent were deficient in height, according to Woodbury standards. The explanation of the improved condition as regards caries is held by Bunting to be in the very low intake of sweetened food as well as the uniformity and regularity

in meals. Forty to 45 per cent of the calories received by these children was derived from starch, mostly cereals.

Bunting and his coworkers acknowledge freely that many observations do not lend themselves to ready explanation and doubt if there is any single principle which can be applied equally to all persons. Some are immune, and for these people it makes little difference what they eat. Possibly this immunity lies to some extent in the inability of the *B. acidophilus* to thrive in their bodies, and this is probably hereditary. There are others who are so susceptible that no diet can check the disease. For the great majority of people who are moderately susceptible, a great measure of protection is afforded by diets which are low in artificial sweets.

There are almost as many opinions on the causation and prevention of caries as there are workers on the subject.

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OPHTHALMIA NEONATORUM

PERHAPS the great majority of us feel that ophthalmia neonatorum has been conquered. From the scientific point of view, this is true, but from the practical point it is not. In spite of the studies which led to the prophylactic treatment by Credé in 1881, ophthalmia neonatorum is still too common. His method was the introduction of 2 per cent solution of silver nitrate into the conjunctival sac at birth. The fall in the incidence of the disease wherever this was done was striking. In Berlin it is said to have fallen from 9.14 per cent to 0.9 in one year in the maternity hospitals. In Munich the incidence fell from 10 per cent to 0.9. On April 1, 1914, in England and Wales, the disease became compulsorily notifiable, and following this, hospitalization was urged, the first special ward for such babies and their mothers having been instituted in Liverpool in 1907.

In 1918, the London County Council set apart St. Margaret's Hospital for a similar purpose. The Public Health Regulations in England define the disease as "a purulent discharge from the eyes of an infant, commencing within 21 days from the date of its birth." Results in other countries bear out those mentioned. Treatment was made compulsory in Denmark in 1900, it being required that 1.5 per cent solution of silver nitrate be instilled into the eyes of every child at birth. In that country the incidence of the disease dropped so that in 1925 they had only one case every second year.

Compulsory notification and treatment probably increases the number of alleged cases and makes statistics somewhat unreliable. On the other hand, the saving of eyes of affected children more than balances such mistakes. For example, in Edinburgh, in 1930, in a series of 173 cases the only accident was impairment of vision in one eye in one child, due to a delay of 10 days in sending the child to the hospital. In the same city during a 12 year period, 393 cases were reported and 202 were treated in hospitals, and in the 12 year period covered, impairment of vision has resulted only in the one case mentioned.

The best practice seems to begin with the mother in prenatal treatment. Accurate diagnosis and efficient treatment of every case of vaginal discharge must be carried out, and if the male parent is affected with gonorrhea, the treatment should extend to him also. The prophylaxis at birth consists of thorough cleansing

of the maternal organs and the instillation into the eyes of children of some antiseptic.

Curiously enough, there is controversy over what this antiseptic should be. Perhaps the majority of people are inclined to use silver nitrate, but there is high authority against this, since the 2 per cent solution of nitrate of silver may lead to "silver catarrh" and some opacity of the cornea. In the United States, de Schweinitz believes that it is not always advisable to use as strong a solution as 2 per cent, and holds that even the 1 per cent solution should be confined to suspected cases. It should be applied only by midwives who have had proper training or by doctors. Other silver preparations, notably the acetate of silver in 1 per cent solution, or some of the organic silvers, such as argyrol in 20 per cent solution, are recommended by some. Some authorities maintain that proper cleansing of the eyes at birth is more important than the silver salt, and advise that the eye should never be opened until the entire face has been thoroughly cleansed—especially the skin of the upper and lower eyelids. Other authorities are just as insistent in warning against the use of substitutes for nitrate of silver, and all prophylactics except silver nitrate are condemned.

It goes without saying that the preparations of silver should be reasonably fresh and in good condition. Practically all authorities agree in advising that the nitrate of silver be neutralized with normal salt solution to prevent its action from continuing for too long a time. In England there seems to be a strong opinion that the facilities for teaching medical students as well as midwives are deficient. The Council of British Ophthalmologists in 1928 pointed out that the instruction of midwives was poor and that most of the instruction was theoretical. In their opinion, practical experience should be provided during the course.

We cannot but conclude that ophthalmia neonatorum and the large toll of blindness which follows are comparatively easy to prevent. The principles were laid down more than 50 years ago, and have never been controverted. Indeed, experience everywhere has shown the soundness of Credé's original teaching, and no marked modification has been introduced which can be regarded as a distinct advance.

REPRINTS ON HIGH-TEMPERATURE, SHORT-TIME PASTEURIZATION AVAILABLE

AT the request of the Laboratory Methods Committee of the International Association of Milk Dealers, a review of scientific information on the subject of "High-Temperature, Short-Time Holding Pasteurization in the United States" was prepared in 1933 by Dr. M. W. Yale of the New York Agricultural Experiment Station, Geneva, New York. This work was published in the *Proceedings of the 26th Annual Convention of the International Association of Milk Dealers* for the Laboratory Section. It also appeared in the March and April numbers of *The Milk Plant Monthly* for the year 1934.

Modern types of high-temperature, short-time pasteurizers in use in this country for the treatment of market milk supplies are illustrated and described. The paper deals mainly with studies of health authorities and others on cream layer volume, flavor, bacterial reduction, development of thermophilic bacteria, and tests with pathogenic bacteria.

Reprints of this work are available and may be secured upon application to the New York State Agricultural Experiment Station, Geneva, N. Y.

LETTER FROM GREAT BRITAIN

TWENTY-ONE YEARS' EXPERIENCE OF TUBERCULOSIS SCHEMES

The conferences of the National Association for the Prevention of Tuberculosis are held alternately in London and in some provincial center. This year provided an opportunity for the metropolis to welcome the conference, and since it was something of an occasion, being the year of the attainment of the majority by tuberculosis schemes in this country, no less, it was appropriate that London should be the meeting place. The attendance was smaller, perhaps, than the occasion demanded and had been expected, but what the meeting lacked in numbers it made up in distinction and enthusiasm. Being a meeting historically important, not unnaturally there was a great deal of "then and now" talk, and of congratulatory reference to progress made.

Prominent among those making addresses was Viscount Astor, who has long been interested in the tuberculosis problem, having been, in fact, chairman of a special committee set up in 1912 to consider it and to offer suggestions with regard to methods of dealing with it. Many of the elements later incorporated in the tuberculosis schemes of health authorities were, in fact, suggested by the Astor Committee. Generally, Lord Astor is recognized as one responsible for much of the really considerable progress made toward the solution of the problem and the reduction in the mortality from pulmonary tuberculosis from 1.08 per 1,000 in 1911 to 0.69 in 1933; and the fall in deaths from other forms of tuberculosis to 5,405 in 1933 from 13,888 in 1911.

On this occasion, Lord Astor was particularly concerned with the question of the relation of the milk supply to tuberculosis, and the necessity for tuberculin testing of cows with tuberculin of a uniform standard. The subject set down for discussion by the conference was "The National Tuberculosis Scheme: The Experience of Twenty-one Years." More or less, the discussion centered round what were, when the scheme was established and no doubt still are, the two main elements—the dispensary and the residential institution. In regard to each a great deal that was said had reference to administrative rather than purely medical matters. Not only to the openers—Dr. Lissant Cox of Lancashire and Dr. Melville Dunlop of Edinburgh—but to subsequent speakers, the principal defect seemed to be a tendency for the dispensary and those associated with it to work in a watertight compartment. The need, therefore, was for closer coöperation between the dispensary and other activities of the health department in the schools and institutions, for example.

Speakers in the discussion on residential institutions sought to show that most astonishing and revolutionary changes had taken place. The old-fashioned sanatorium, it seems, has completely disappeared, replaced by a hospital very largely surgical in design, presided over by a physician who is less an authority on tuberculosis than a hospital director. The conference in general was a very pleasant and interesting one and, if it did no more, showed at any rate the extent of the progress made in the twenty-one years during which schemes have been in operation; how matters now stand, and the directions which effort in future should take.

PREVENTION OF CHILD TUBERCULOSIS

At the National Conference on

Maternity and Child Welfare, which was held at Birmingham some two or three weeks after the Tuberculosis Conference, among other matters tuberculosis again came up for review.

In a paper on the prevention of the disease in children under 5 years of age, Dr. Dixon, the tuberculosis officer of Birmingham, opened a discussion that interested the conference greatly. From figures submitted, which proved that some 20 per cent of 1,813 cases investigated gave a history of contact in the home with a known case of pulmonary tuberculosis, it seemed clear that preventive action of some sort was necessary. The lines suggested were the production of some degree of immunity, and secondly the introduction of measures that will result in breaking the child's contact with a known source of infection. In the latter connection reference to the need for coöperation between the infant and school child welfare workers and those engaged in tuberculosis work was made.

Segregation of infective cases was also praised as advantageous, though it is interesting to note that the voluntary was counted preferable to the rigorous and compulsory isolation of cases, since in many instances the latter might be a harsh procedure.

A note in this paper worth repeating has reference to the fact that in the colonies at Papworth and Preston Hall, no child born in the village has yet shown evidence of clinical tuberculosis, and no single case of tuberculous meningitis in a child has yet occurred. "Moreover," it is added, "the children, when old enough to work, enter the workshops in the colony and work in daily contact with tuberculous persons."

Among other subjects of importance discussed at this conference were the reduction of neonatal mortality and orthopedic work among preschool children, the contributors including Dr. G. F. McCleary, who, though he is better known as an authority on matters connected with the operation of the national insurance acts, has made some notable contributions on the subject of infant welfare.

AMERICAN DELEGATES TO THE HEALTH CONGRESS

The Health Congress of the Royal Sanitary Institute, generally regarded and accepted as the one occasion during the year when workers in, and persons concerned with, public health and preventive medicine can meet and confer together, was held at Bristol from July 9 to 14. If it was no more, it was certainly no less brilliant as an affair than any of its predecessors. If anything it had more of an international aspect than usual, visitors from other countries and British dominions overseas attending in considerable numbers. Prominent among these were Professor Walter Brown, who, in responding to the toast of "The Guests" at the "overseas luncheon," one of the pleasantest of the functions held during the week, appeared to share the astonishment at being grouped with foreigners in my country that I have experienced at being similarly classed in his!

Other colleagues from the United States it was a great pleasure to meet and greet were Passed Assistant Surgeon R. B. Holt, representing the Government, and Dr. Jackson Davis, who, with Professor Brown, represented the Association and at the same time acted as delegates of the New York State Department of Health.

Thomas B. Appleget and Dr. G. K. Strode of the Rockefeller Foundation, the latter its representative in Europe though not included in the official list of delegates, spent several days at the Congress and were very welcome visitors. Dr. Holt and Dr. Strode both took part in discussions, and the former, in addition, made an attractive speech at the opening ceremony.

The programs of the various meetings were very heavy, but in spite of the exceptional warmth and fineness of the weather, the great bulk of the 1,500 persons present appeared ready to attend and to take part in discussions. The attendances at the numerous social functions were very large also, perhaps all the larger because the climatic conditions were so favorable. This was particularly the case with outdoor functions such as garden parties, several of which had been arranged by the authorities of the University of Bristol among other of the several very hospitable bodies and individuals in the city.

One of the most interesting hosts was the Society of Merchant Venturers, which dates back to the 14th century and claims Cabot as one of the earliest of its chairmen. Possibly for this reason the society is extremely exclusive, and invitations to such functions as the luncheon given on the occasion of the congress are greatly valued by the recipients.

STERILIZATION OF MENTAL DEFECTIVES

Of the subjects discussed at the sectional meetings and conferences, many naturally had what was practically a local appeal only, having reference to difficulties and details, administrative mainly, with which health workers in this country are faced.

In a number of places quite a considerable amount of attention was given to the subject of housing, with which, as I have already explained, strenuous efforts are now being made to deal. Just how serious these efforts are may be judged from the fact that the Minister of Health himself (Sir E. Hilton Young) considered it worth while to attend the congress for the purpose of delivering an address.

In more than one section also the discussions had reference to the question of mental hygiene. This was particularly the case in the Preventive Medicine Section where a session jointly with the Conference of Medical Officers of Health was devoted to a consideration of the problem of the mental defective. In this I was particularly impressed by the number of references to such procedures as euthanasia and sterilization as remedies. Coming from specialists in the treatment of mental diseases, several of whom attended and spoke, I was interested in the criticisms made of the recommendations in favor of voluntary sterilization offered by the departmental committee set up by the Government to consider the question. Considerable doubts were expressed as to the likelihood of any effect whatever upon the problem being produced by the procedure. If it was to be adopted at all, the view seemed to be that it was preferable that it should be voluntary, the experience of Germany, where drastic measures had resulted in the concealment of cases of defect, being unfavorable to the adoption of anything resembling compulsion. Among contributors to this discussion were Dr. Holt and Dr. Strode, the joint presidents of the section and conference being two Honorary Fellows of the American Public Health Association, Professor W. W. Jameson and myself.

London CHARLES PORTER, M.D.

PUBLIC HEALTH EDUCATION*

"There are no dull subjects; there are only dull writers."

Mobilization for Human Needs—The health agencies supported, at least in part, by community chests will be much concerned with the plans for the intensive mobilization period, Oct. 21 to Nov. 11, 1934.

Much national publicity is to be issued by Community Chests and Councils, Inc., 420 Lexington Ave., New York, N. Y.

Health workers may contribute to the success of the nation-wide effort by supplying ideas, statistics, and other factual material including case stories. Most useful will be anything showing needs or results, or progress in terms of results.

Send such material to Louise Franklin Bache at the above address. Miss Bache is the author of *Health Education in an American City*.

An Exhibit of Mail Campaigns—The Direct Mail Advertising Association announces that it will build a new traveling display showing how major industries use direct mail. There will be a social service section, which would include health. Users of direct mail for money raising or otherwise, are invited to submit specimens to the Educational Committee, Elmer S. Lipsett, chairman, 89 Broad St., Boston, Mass.

Paintings Show Hospital Life—Under the title, "Hospital Art Shown at World's Fair," the *Trained Nurse and Hospital Review* for July, 1934, describes a series of 40 paintings by Kay Bishop, which are now hanging in the Hall of Science. Six of the pictures are reproduced. Whatever is to be done with them when the fair closes, it seems probable that these paintings will serve a useful purpose for a long time to come, both in the original and for reproduction. (468–4th Ave., New York, N. Y. *35 cents.*)

Scientific Information and Newspaper Readers—Austin H. Clark, biologist and member of the staff of Smithsonian Institute, has for several years directed press service for the American Association for the Advancement of Science. Out of this experience he tells scientific men some of the problems in adapting scientific material to newspaper readers. Of special interest to health workers is his statement that

> Articles concerning the physical and mathematical sciences must be written more or less on a witchcraft basis.
>
> Urbanization and the phenomenal engineering and mechanical advances of the past quarter-century have so isolated us from the fundamental factors of our natural environment that we are prone to regard ourselves as wholly free from the mental shackles of superstitions and the belief in the supernatural that characterize men and women

* Please address questions, samples of printed matter, criticism of anything which appears herein, etc., to Evart G. Routzahn, 130 East 22d St., New York, N. Y.

less fortunately situated—that is to say, savages and our own ancestors.

But, while continuing to flatter ourselves with this comfortable belief, let us constantly remember that the human mind has not changed, and that all the beliefs we deprecate in the so-called savages and try to forget in relation to our own forbears exist today in most newspaper readers—and also in us—in a more or less modified form.

Successful publicity for science is based first of all upon the recognition of people for what they are; it is futile to assume that we can make them over into what we would like them to be.

He also stresses the fact that the public is interested in personalities and emotions, while scientific men believe at least that they apprecate the world on the basis of determined facts. Every scientific article written for popular consumption, he says, must be tied to some personality. And " in addition to being tied to some personality it must have as a keynote—love, hate, gain, loss, mystery, or some other basic emotional concept."—*Editor and Publisher,* Times Bldg., New York, N. Y. June 30, 1934. *10 cents.*

Not Talking Down, but Talking With Readers—The *New York Daily News* has in its 15 years built an enormous circulation. In the discussion of its policies in *Editor and Publisher,* June 30, its general manager takes issue with a criticism that it is edited for 14-year-olds. The intelligent adult, he says,

. . . revels in a display of brawn and mastery. That is human nature. Perhaps the same man will come home from the prize fight and pick up Shakespeare and read it and enjoy it. It is our feeling that the 14-year-old mind, and even the 8-year-old mind, is a part of the mental equipment of the average human being.

He adds that the *News* is edited to meet the various requirements of the average person's mental equipment. He thinks that it is of greatest importance that its writers should be a part of the crowd. They should feel as the masses feel and like the same things that the masses like. (Times Bldg., New York, N. Y. *10 cents.*)

Some Approaches to Broadcasting—Before us are three series of weekly or twice a week radio talks sponsored by city and state health departments. They cover periods of about 6 months. Back of each of these three broadcasting programs was a conception of the task, or at least, a state of mind about it that is worth considering as you review your own recent programs or your plans for the coming year. The first series might be described as an " its your turn now " technic. Evidently the head of each bureau in the health department was assigned his or her period on the air, given the allotted number of words. From this point on, there is no evidence of any plan or supervision. Half of the talks seem quite unsuited to radio—prepared as though to be delivered in a classroom. The others are more or less interesting, but on widely varying intellectual levels. There was nothing in the series to attract or hold a steady group of listeners. Whoever was responsible for the series regarded his part in it as merely one of arranging dates and getting copies of the talks into circulation.

The second series was also passed around among bureau heads, and also other health specialists, but someone with a pretty definite idea as to what radio audiences would like must have consulted, revised, coached, titled, and otherwise kept the whole program on a level with the interests of everyday conduct the talks were intended to influence. Both titles and opening paragraphs suggest familiar experiences, or use familiar phrases.

The third is a one-man series and apparently the speaker was chosen because he could do this kind of thing

better than anyone else. The talks appear to be planned for a somewhat limited audience, made up of those who want to be better informed rather than those who are looking for advice for immediate use; but certainly the radio supplies such an audience. There is an appeal to the intelligence, but no strain on the capacity for sustained interest. Historical information and anecdotes are used to introduce talks on medical discoveries and the conquest of disease.

Telling the Public About Maternal Mortality — The obstetric advisory committee of the Children's Bureau urges that "there should be widespread education of the public as to the ing":

1. That the high maternal death rate is due largely to controllable causes.
2. That it is necessary for all women to have adequate supervision and medical care during pregnancy, labor, and the postpartum period, such supervision and care to begin early in pregnancy and to be continuous through the postpartum period—
   a. In order to safeguard the health of both mother and child.
   b. In order especially to control the infections, toxemias, and hemorrhages that this study and others have shown to be real menaces to life.
3. That there is danger of death or serious invalidism following abortions, spontaneous or induced.
4. That the community has a definite responsibility to provide adequate medical and nursing facilities for the care of women during pregnancy, labor, and the postpartum period. This predicates the proper organization of hospitals, outpatient services, and medical and nursing personnel, and applies to both home and hospital care. The community should know the standards for hospitals taking obstetric cases that have been drawn up by the American College of Surgeons.
5. That judicious selection of the hospital to be used for maternity care is of the greatest importance when hospitalization is planned.
6. That the better education of those caring for women during this period is essential and should have public support. This includes adequate obstetric training for medical students, postgraduate obstetric training for physicians in practice, to keep them abreast of modern developments, the training of nurses in good maternity care, and the training and supervision of midwives in communities where midwives still practise.
7. That it is important to make careful and intelligent selection of the attendant for maternal care.

Physicians should assume leadership in a number of directions, including:

1. Informing the public that the high mortality during pregnancy, delivery, and the postpartum period is due largely to controllable causes.
2. Warning the public as to the dangers occasioned by abortions, spontaneous or induced.

From *Maternal Mortality in Fifteen States,* a study of the Children's Bureau. Superintendent of Documents, Washington, D. C. 234 pp. *20 cents.*

Getting a Thrill Out of Figures— There is no attitude of "take them or leave them" about the service statistics in the Palama Settlement's 1933 report. They are all told as though figures were exciting.

35,701 hours of public health nursing represent another phase of Palama's contribution to the community.

Think of 35,701 hours packed with highly skilled ministrations to the sick, persuasive health teaching to the well, supervision of the health of the children in 22 public schools and 14 kindergartens.

Think of 591 women carried through many months of pregnancy with health guidance under medical supervision in 154 prenatal conferences and with *no deaths* from maternal causes.

Think of 1,610 infants under 1 year of age and 1,534 between 1 and 6 years of age receiving, in 579 child health conferences with physicians and nurses, health guidance that a few years ago no amount of money could buy.

This is an exceptionally interesting and attractive report of work at a health center. Philip S. Platt, Director, Palama Settlement, Honolulu, Hawaii.

A 40-year-old Book Still Going Strong—"Publication today of the fifteenth edition of a work of non-fiction that has been read more widely by women than any other published in America prompts the First Reader to consider this unique phenomenon in the manner of the author":

What book has this remarkable distinction?

It is Dr. L. Emmett Holt's *The Care and Feeding of Children.*

How do you account for that?

It has sold 800,000 copies, and every copy has been read by at least 5 mothers and discussed by 20. It is known as the "Baby Bible," and a whole generation has been brought up on it.

How did it get this extraordinary distinction?

Because Dr. Holt put aside the pretensions of the medical priestcraft and in the simplest terms discussed the care of children so that every mother could understand it. Besides, he wrote advice that was meant to keep the child well. He did not alarm the mother with a parade of symptoms and a list of preposterous precautions. He did not tell anecdotes of all the terrible cases he has observed as a physician. He took for granted that the young mother wanted to know how to feed, clothe and train her infant and keep him healthy and gaining. And because he had a fund of simple words he put it into the English language, forgetting Latin, Greek, and the passwords of the doctors.—Harry Hansen in *New York World-Telegram.* July 19, 1934.

Dollars or Children?—The puzzling combination of falling death rates and a widespread hunger is the theme of an article by Paul De Kruif called "Dollars or Children" in *Ladies' Home Journal* for August, 1934. The author refuses to accept "the blessings of poverty" point of view in the face of mortality statistics which seem to give validity to that phrase. "I have just begun to understand how the science, the brains, the wit, the devotion of a miserably paid small army of men and women can guard a fundamentally teachable mass of humanity from the deadliness of this needless poverty. It is a gleam of hope in a world gone hay-wire, this spread of knowledge down to the lowest depths, trickling an economic system that puts dollars ahead of the lives of children." He tells the story of Detroit's public health education work and coöperation of physicians declaring that it is only because brains and devotion with next to no money are still there, that sickness is prevented.

I wonder if we hadn't better urge our searchers to turn from their marvelous death-preventing diphtheria toxoids, to look for a real cheap vaccine against the spiritual miasma that's beginning to follow want amidst plenty? There was a very crabbed old Scotsman, Thomas Carlyle, who understood it when he said: "It is not to die, or even die of hunger, that makes a man wretched; many men have died; all men must die—the last exit of us all is in a fiery chariot of pain. But it is to live miserable we know not why; to work sore and yet gain nothing; to be heart-worn, weary, yet isolated . . . girt in with a cold universal laissez faire."

I'm beginning to look a little into the happiness of these children in my state of Michigan. Happiness is built fundamentally on vitality. And if the children's vitality is only maintained—why should we be so proud that in spite of needless want we've simply maintained it?

Environment can lift the vitality and happiness of children. Except for those queer dollars, environment is here as we choose to make it . . .

This article, by the author of *The Microbe Hunters,* is a contribution to public understanding and appreciation of health work for which both health officers and privately supported health agencies may well be grateful.

A Review of a Two-year Radio Program—Mimeographed copies of the radio talks on personal and public health presented by the Jefferson County Board of Health, Birmingham, Ala., during the last two years have been bound together in two convenient reference volumes under the title, "Health by Radio." Since a regular program of this kind reaches a fairly stable nucleus of listeners, it may be considered as a whole as a teaching

program. From this standpoint, a good feature is the repetition from time to time of the same subject under different titles, and as part of more inclusive talks. For example, tuberculosis is the theme of at least four separate broadcasts in Volume II, and is brought up again and again in connection with broader topics.

A broadcast on "Medical Words and Their Meaning," seems to us a topic worth repeating more than once. Too many words were defined in a single talk. This important factor in broadcasting, of getting technical terms understood, might well take account of the difficulty in grasping unfamiliar words when they are heard and not seen. Words like bacilli, antitoxic, microorganism, miasmata, were used in the process of defining other words, thus piling up the listener's confusion rather than helping him out of it. The advertiser repeats the name of the product over and over again and spells it more than once.

Perhaps the announcer made up for the rapidity with which words and ideas were passed over by urging people to send for the talk. A reminder that you could get a copy of the talk could be given in the course of the talk as well as at the beginning and the end.

The occasional use of provocative titles in addition to the simple descriptive titles like "Nerves," "Sleep," and "Summer Colds," is a good feature. "The Disgrace of Dying" is a novel way of arousing a sense of responsibility for both personal and public health. The blame for practically all deaths but those of old age is put squarely upon causes for which either individuals or the community are to blame.

But everyone who dies from any other complaint than old age, dies prematurely from an "unnatural" cause: and in the vast majority of cases, a premature death is a preventable death: hence, a disgraceful, because an unnecessary, death. The average death is a reflection on the intelligence of somebody; either the victim, his family, or of the larger family, which is the community or society in which he lived. You may not believe this, so permit me to elaborate somewhat.

Under the popular "Believe It Or Not" challenge, the listeners are invited to test their own beliefs about certain widely held superstitions, fads, or half truths.

Some other good topics which approached public health from the point at which listener interest is greatest, are "How's Your Rheumatism?" "Wooden Indians" (about how ideas and knowledge have changed), and "Little Bugs and Big Bugs."

For the Three-year-old in England—Sir George Newman, in his *Annual Report for 1932*, as Chief Medical Officer of the Board of Education, urges

. . . local authorities throughout the country now to concentrate on the preschool child as they concentrated originally on the problem of infant mortality. He points out that the work of the school medical service is gravely prejudiced by the continued influx, year after year, of large numbers of young children suffering from impaired health and physique. Further, he writes: "The exceptional saving of infant life since 1910 has added to the population thousands of young children who, under less favorable circumstances, would not have survived. If, in addition to our continued neglect of the preschool child, we are also saving many physically and mentally enfeebled children, it is obvious that we must anticipate a heavy burden of defective children coming into the schools at 5 years of age."

In Durham County "an interesting and novel form of propaganda is being tried."

During the health week campaign in the county last year a number of the child welfare centers celebrated Health Days, and made each Health Day the occasion of a "Three-year-old Welcome Party."

A series of these parties is still in progress in the county. A card is sent to the mother of every three-year-old in the area served by the center, inviting her to the party, and

suggesting that as she will probably like to know her child's weight, and as there will be a crowd on the day of the party, opportunity is afforded for the weighing of children on a day preceding the event. A great many parents have risen to the occasion, taking the trouble to have their three-year-olds weighed on the day before the party.

. . . It is much easier to get an idea of what the three-year-old population looks like if the children "process" alone, but, as the organizers of the parties found, it is by no means easy to get, say, a hundred lively and cheerful three-year-olds to form a procession, and it is surprising how soon a carefully arranged procession turns into a gay riot.

After the procession the mothers listen to an address, given by the medical officer of the welfare center, on the health and care of the three-year-old.

—*Mother and Child*, 5, Tavistock Square, London, W.C.1. Jan., 1934. *9d.* a copy.

The Fifth New York State Health Poster Contest—This year the subject of the annual health poster contest in New York State was "Edible greens at little or no cost." The winning poster has as its slogan "Eat More Greens—They Are Nature's Best Tonic." A scholarship prize and three cash prizes went to high school art students. Further information about the posters can be obtained from the State Committee on Tuberculosis and Health, 105 East 22d St., New York, N. Y.

Health Education in the Journal—In *American Journal of Public Health*, July, 1934:

"Outline of Institute on Maternal Care by Victorian Order of Nurses for Canada."

"A New Deal in Health Education," by Bertrand Brown. The "basic task"; an institute of health education.

Eleven and One-half Per Cent—The analysis of registration at the 1933, Indianapolis, meeting of the A.P.H.A. revealed that 53 out of the 456 members of the Public Health Education Section were registered. This 11½ per cent was exceeded by 8 sections. One section only had a smaller percentage registered. Details in July, 1934, *Journal*, p. 754.

Is There Need for Nutrition Propaganda?—The National Baby Week Council, at a meeting in London, Nov. 15, 1933, discussed nutrition as a possible topic to be emphasized during the coming year. Dr. Eric Pritchard said:

The need for a spread of knowledge on matters connected with food and nutrition exists in all ranks of society. The newer knowledge of nutrition is beginning to invade all classes, but it advances slowly, and we should like to see the pace accelerated. Very complete knowledge does exist at the present time on these subjects, but it remains in the hands of the few, and requires far wider dissemination. This newer knowledge of nutrition includes certain general principles, the observance of which makes all the difference between good and bad health. The application of this knowledge does not involve, as a rule, any additional expenditure, but it does require more intelligence in the expenditure of that proportion of the income which is allocated to the purpose of buying food.—*Mother and Child*, 5, Tavistock Square, London, W.C.1. Dec., 1933. *9d.* a copy.

Lessons from the Past—Local and general history offer much material for attracting attention and emphasizing progress and how it may continue.

An extended article by W. R. Riddell illustrates anew the fascinating material to be found in the history of medicine and the health superstitions of the past—material which may lead readers into more prosaic information usable in the present day. In *Canadian Health*, 105 Bond St., Toronto, Ont., March, 1934. *15 cents.*

"Health In Boston a Century Ago" is based on a study of vital statistics, suggesting the usability of similar Studies of other cities. *Statistical*

Bulletin, Metropolitan Life Insurance Co., New York, N. Y., April, 1934. *Free.*

Under "Then and Now," *Michigan Public Health,* Lansing (Oct., 1933), says:

The modern method of teaching health to children by putting it into their daily living rather than merely into their textbooks is a drastic change from the old way. In the library of the Michigan Department of Health is a "Catechism of Hygiene" published in 1893 and made up of 396 questions and answers. The preface suggests that these be "committed to memory as are the A B C's. They contain the essence of the whole science of hygiene, and, when they have been memorized, the pupil will be ready to take up the more advanced books on the subject and read them with understanding."

For the encouragement of those who may be inclined to question the newer method, we quote from the Catechism:

"Q. 68. What is the most unhealthful occupation?

"A. Hotel waiters are the most unhealthy of all men.

"Q. 69. Why are hotel waiters so unhealthy?

"A. Because hotel waiters are all the time eating the food and drinking the liquor that the guests leave at the table; they thus ruin their stomachs and destroy their health."

Material for Panel Discussion—A page and a half of statements and questions were offered to panel and audience at a social hygiene session of the Annual Conference of State and Local Tuberculosis and Public Health Committees, State Charities Aid Assn., New York.

Horace H. Hughes, reporting the panel, says:

The participants in the panel discussion were sent mimeographed copies of these and other questions to be discussed several days before the Convention. They were requested to give their frank opinion. Several hours before the panel was held the chairman discussed informally with the various participants the general questions to be brought out. Copies of the questions were given to the audience.

Dr. Parran made the discussion as informal as possible. The speakers were seated on a platform about one foot high in a semi-circle, facing the audience. It seemed to many observers that much more frank discussion of problems of social hygiene were accomplished by this method of presentation because there were no set speeches and each participant spoke as if he were conversing with a group of friends.

Of course, we found several difficulties which will have to be overcome if in the future this type of meeting is to be completely successful. The most important is the problem of maintaining the informality and yet having the speakers talk loud enough so that they can be heard in the rear of the hall. I think that the success of any panel discussion depends largely upon the chairman. He must maintain a fast tempo in the meeting and be thoroughly acquainted with the subject. We, fortunately, had an excellent chairman in Dr. Parran.

Copies of the discussion outline will be supplied by S.C.A.A., 105 East 22d St., New York, N. Y. Enclose return postage.

Health Education as It Is—The need for health education of adults, and what is done in a rural health district is presented by Dr. G. M. Little, Red Deer Health District, Alberta. Dr. Little gives a picture of what is done when there is one man for everything except nursing and sanitary inspection. (*Canadian Public Health Journal,* 105 Bond St., Toronto, Ont., May, 1934. *35 cents.*) What is particularly needed is a detailed description of the job of getting health education done under such circumstances; what time is given to it; how to decide what to be done; what use is made of committees and other volunteers.

The health values of "Education Through Physical Education" are reviewed by J. E. Rogers in *Mind and Body,* New Ulm, Minn., March, 1934. *20 cents.*

What a community should know about the local aspects of public information on social hygiene is a section of "Organizing a Community Social Hygiene Program." There are ques-

tions about what the health agencies do, the newspapers and the public library. In *Journal of Social Hygiene*, 50 W. 50th St., New York, N. Y., May, 1934. *35 cents.*

"A Tuberculosis Survey" of Hawaii and Honolulu was two years old when it reached us, but the chapter on popular health instruction and publicity is worthy of mention as presenting what is, probably, a typical situation. Considerable use of various mediums is stated, but qualified by such phases as "no definite effort has been made to . . ."; "There is no coördinated plan of . . ."; etc. "In conclusion, the educational activities for the general public are rather unorganized."

They Know and They Do—"The Chief Duty of the Health Officer," is discussed by Dr. J. D. Applewhite, Macon, Ga., in *Southern Medical Journal*.

It is, of course, necessary that every well regulated health department have certain rules and regulations which require the citizens under its jurisdiction to do certain things and it is necessary from time to time to use the courts to force some individual to comply with them. However necessary such regulations may be, it is far more important that our citizens be so informed that they shall be anxious to comply with all reasonable requirements for their own and the public protection.

Published in full in *Bulletin*, Texas *State Dept. of Health, Austin.* May, 1934.

The A. M. A. and Health Education—A sketch of the organization and activities of the A. M. A., "The American Medical Association and Its Interest in Health Education," by Dr. W. W. Bauer, in *Journal of Health and Physical Education* (May, 1934), includes:

In 1911, long before health education was a popular subject, the American Medical Association established a Council on Health and Public Instruction, which has since become the present Bureau of Health and Public Instruction. The purpose of the Bureau is to promote popular understanding of health and the relation of medicine to the public health through such media as *Hygeia*, *The Health Magazine*, pamphlet publications, radio talks, coöperative advisory relationships with lay organizations interested in health education, health exhibits, personal addresses by the Director, and by furnishing material for activities in health education to state, county, and district medical organizations. It also endeavors to further the periodic health examination. It answers thousands of letters every year, addressed to *Hygeia*.

In 1923, the American Medical Association launched a project which has proved to be unique, namely a magazine of national circulation devoted exclusively to authoritative material on health and health education. The magazine was appropriately named *Hygeia*. It was supported for several years at heavy loss and has never been a source of profit to the Association. It is dedicated to the purpost of enlightening the public with relation to health and medical matters and it represents the conviction of the medical profession that the public is entitled to such knowledge about health as can profitably be acquired by non-medical persons. The features of *Hygeia* are articles on various health topics from outstanding lay and medical authors; a department of school health; a juvenile department; a department of questions and answers; pictures of health interest from the far corners of the globe; health news and views in brief; and an advertising section which can be relied upon to be free from harmful exaggeration and misrepresentation.

The Association established a Bureau of Exhibits in 1930, which in addition to managing the Scientific Exhibit at the annual meeting and the permanent central scientific exhibit at headquarters, sends out numerous exhibits in connection with fairs, meetings, and conventions. These latter are of an educational nature and calculated to appeal to lay observers.

Reprints of the article, *free*. A. M. A., 535 N. Dearborn St., Chicago, Ill.

Classes and Conventions—Courses and convention topics on child health education are no novelty, but mention of courses and addresses on adult health education may well be recorded here as news.

Health education was given several periods on the program of the Annual Conference of Health Officers and Public Health Nurses and the Annual Meeting of the American Assn. of School Physicians, Saratoga Springs, June 25–30:

"Health Education in Rural Communities," by Gilbert D. Forbes, M.D.

"Health Publicity That Gets Results," by Elizabeth Wells, M.D.

"New Method in Public Health Education" (Demonstration of electrical transcription of radio health plays).

"What Can the Hospital Contribute to the Community Nutrition Education?" was presented at a meeting of Michigan Hospital Assn., and Michigan State Nurses Assn.

Rutgers University Summer Session Courses in Public Health Administration, 1934, will include Public Health Education, conducted by C. K. Blanchard.

The Flavor in Writing—Under this heading says *News Bulletin* of Social Work Publicity Council, 130 East 22d St., New York, N. Y. (June, 1934):

From Montreal comes a tip, not meant for copy, but highly applicable: "A year or so ago we had a convention of master bakers in Montreal and apparently there was a lengthy session on the difficulties of selling bakery cakes. One master baker got to his feet and said, 'I know why you can't sell your cakes. You put vanilla in all of them.'"

As vanilla is a too favorite ingredient in social work writing, we have selected this month some unvanillaed examples.

Then follow examples, including two from the health field:

Changing from direct-information-giving to conversational discussions will often vary your flavor. Our old friend, Ben Hustler, in the bulletin of the New Jersey Department of Health in *Public Health News*, March, 1934, has a nice informal way of mixing health information in with the repairing of pistons at his Piketown Garage. Mark Time, looking on at the repairs says that Ben is fine at remembering things, especially Board of Health rules: "Think of all I've forgotten, too; those incubation periods, for instance. You could stick me on most of them now." "*Me* stick you," exclaimed Mark. "Why, I don't know yet what they are. What is an incubation period, anyway?" Hustler straightened up and pondered a few seconds. "It's the time it takes a disease to show itself after it begins to grow. Same idea as the incubation time for an egg." Mark knew about eggs. "You mean you set a hen on a clutch of eggs and in 3 weeks the chicks hatch out." "Yes, and when chicken-pox infection gets on the inside of a child, which is a sort of warm, moist, dark, incubator, in about 2 weeks the chicken pox hatches out—all over him." "Humph! I don't see much connection between chicken and chicken pox," grunted the assessor. "I mean they both follow the laws of nature which set certain lengths of time for things to develop," Ben answered. "The laws hold true whether it's disease or chickens, or 90-day corn or——." "Now let's see about this!" interrupted Mr. Time, becoming interested. "Suppose I was to get typhoid fever from some carrier who infected my food. Could you tell me when I'd begin to get sick?" Hustler worked a freshly oiled piston back and forth as he replied. "Sure, anyone who knew the facts could guess pretty close. You would probably begin to feel tired or so, have a headache and feel sick after 10 days, and go to bed and call the doctor about 2 weeks after you swallowed the germs."

In another health bulletin, the State Board of Health of Kentucky for March, 1934, we find another informal giving out of public health information. A public health nurse working in a pioneer field in Michigan exchanges letters with her old school mate, a rural teacher in the mountains of Kentucky. Each tells the other how a challenge in public health is being met in her own community. Right along with personal news and thanks for some cookies for which the recipe is requested, is such information as: "My immunities are coming up steadily and several schools are on the way to becoming budding health centers. Isn't it surprising what one can accomplish in the homes through the interest of the youngsters! I know that I have not used my teachers half enough, when, after all, they are the key people. . . . As I read your letter, I was aware that I should be stressing more the educational values of first aid kits in all my schools. . . . I'm going to bring in some country children to help in the demonstrations. . . ."

From Kentucky to Michigan goes the news of what happened after the Christmas vacation when the children reported on their trips

to the dentist, to the oculist and to the orthopedic surgeon as recommended by the school nurse. They both make fun of Asthma, the Michigan's nurse's car. Says the Kentuckian: "I can picture you in a cloud of steam, in snow to your knees, high zippers, and with burlap bags in front of your wheels, and you behind shoveling. . . . Just another month down here and the birds come back. . . ."

RADIO

Personal reminiscence is used by Dr. W. A. Plecker of the Virginia Department of Health, Richmond, to get attention to his radio talks. An incident impressed strongly on his mind when he was a child of 8 introduces the talk on "The Effect of Alcoholism on Longevity." An experience as a student personalizes a talk on the prevention of deafness. Other introductions use anecdotes or historical references which carry the reader by easy stages into subjects like "The Conquest of Rabies," "Diphtheria in a Happy Family," "Frontier Mothers," and "Fighting Typhoid with Peacock Feathers."

"The Trial of the Tubercle Bacillus," prize-winning radio talk for the 1933 contest conducted by Minnesota Public Health Assn., "is regarded by the contest judges as one of the cleverest and most effective ever presented in these contests." In *Everybody's Health*, 11 W. Summit Ave., St. Paul, Minn. March, 1934. *10 cents.*

"Bleeding Gums—The Pink Tooth Brush,' by Dr. W. R. Davis, opens with an incident and uses everyday illustrations. *Public Health*, Michigan Dept. of Health, Lansing. Oct., 1933.

"The Public and the Quack" is a friendly explanation of the quack and quackery, and how to avoid both. Connecticut Dept. of Health, Hartford. March 8, 1934.

A New Health Education Service

A NEW health information service in unique form has sprung up as an enterprise of the Association of Women in Public Health, a nation-wide organization of women professionally engaged in some form of public health or health education work.

For several months past a special committee has been active in securing, through the association members, fragments of authoritative health information. These have now been assembled in question and answer form and are offered as the first installment of a continuing annual service with semi-annual revisions, by means of which the subject matter is kept up to date.

This service is designed to assist schools, colleges, public libraries, boards of health, nursing organizations and others who are concerned with public education in matters of health.

Further information may be obtained by addressing: The Health Knowmeter Committee, Department of Public Health, 100 Nashua St., Boston, Mass.

BOOKS AND REPORTS

A Review of Public Health Realities

—Papers of Charles V. Chapin, M.D. New York: The Commonwealth Fund, September, 1934. 268 pp. Price, $1.50.

Dr. Chapin has enjoyed many and well deserved honors—the Presidency of the American Public Health Association and the American Epidemiological Society, the Marcellus Hartley gold medal of the National Academy of Sciences and the W. T. Sedgwick medal of the A.P.H.A., honorary degrees of Sc.D. from Brown and R. I. State College, and LL.D. from Yale. There is no honor more gratifying, however, than the publication of a volume of collected fugitive writings, for this means the preservation in lasting form of the essence of one's life. Two of Dr. Chapin's longer works, *The Sources and Modes of Infection* (1910), and *A Report on State Public Health Work Based on a Survey of State Boards of Health* (1915), have a fixed place among the classics of public health, and the present volume of collected papers should take its place by their side.

An illuminating foreword by Haven Emerson and an admirable outline of Dr. Chapin's life by C. H. Scamman precede the collection of 16 reprinted papers. Six are classed in the field of Public Health Administration, 5 under the head of Control of Communicable Diseases, and 5 as contributions to Epidemiology and Vital Statistics. It is of interest to note that 8 of the 16 papers selected for this volume were either addresses presented before the A.P.H.A. or were first published in this *Journal*.

Five of the papers seem particularly outstanding. *The Fetich of Disinfection* (1906) and *Studies in Air and Contact Infection at the Providence City Hospital* (1911) contain the basic arguments of *The Sources and Modes of Infection. How Shall We Spend the Health Appropriation* (1913) initiates the second major line of Dr. Chapin's endeavors—a line which has borne direct fruit in the work of the Committee on Administrative Practice of the A.P.H.A. These two threads run through many of the other papers and constitute Chapin's outstanding contributions to sanitary science. He taught us that diseases come from persons and not things and that they are spread only only by contact, food and animal carriers; and he inspired us to evaluate all our efforts in terms of concrete achievement in a way which has made public health at least approximately a quantitative form of social activity.

The other two papers which seem to the reviewer of most far-reaching significance along more special lines are *Deaths among Taxpayers and Non-Taxpayers* (1924), one of the most suggestive contributions to the vexed question of the relation between health and economic status; and *Changes in Type of Contagious Disease* (1926) the Sedgwick lecture which demonstrates so clearly the existence of variant types of infecting agents in smallpox and scarlet fever.

Perhaps the most important pages in the volume are those devoted to a bibliography of Dr. Chapin's publications including 133 titles. The 16 papers chosen for reprinting are admirably selected; but they may serve best as samples to tempt the reader to search out and study the rest. Dr.

Chapin's contributions to the philosophy and methodology of public health are greater than those of any living man. In the past only Frank, Chadwick, Simon, Shattuck, Sedgwick, and Biggs have perhaps made an equal impress upon public health practice throughout the world. The student of this subject will find in every paper he has written inspiration and sound guidance. The editor and the publishers have therefore rendered a splendid service to us all in the preparation and publication of this volume. C.-E. A. WINSLOW

Influenza. Part I.—*By David Thomson and Robert Thomson. Williams & Wilkins,* 1933. 640 pp. Price, $12.50.

Students of the problems of bacteriology and allied sciences have learned to value the compilations issued by the Pickett Thompson Research Laboratory. Vol. IX is devoted to an arrangement and summary of the world literature dealing with influenza. It is not surprising that a subject so engaging to clinician, epidemiologist, and bacteriologist cannot be compressed into 700 pages; consequently the present volume represents but the first half of the vast undertaking.

The outstanding weakness of such a work is obviously that influenza is more of a name than a clinical entity, and the authors have been forced to include material dealing with a variety of disorders because exact criteria of diagnosis and identification are lacking. The casual reader is at once disturbed by the mass of conflicting data presented and the thousands of contributions written in the name of science which in the light of a more mature judgment hardly justify consideration. However, in this most complete of summaries, each point of view is so patiently and fairly presented that were it not for occasional gentle and skillful direction on the part of the editors, a complete critical breakdown would ensue.

A volume of this kind is always impressive; not only is it a masterpiece in collecting and organizing knowledge, but it is in itself an epic, portraying through its very confusion mankind's gropings to solve and eradicate this and other natural scourges. That he has failed thus far in the instance of influenza must be admitted. In spite of the most careful study of bacteria associated with the disease, none, not even the Pfeiffer group, can be demonstrated conclusively as the primary etiological agent. Recent isolation of various filtrable viruses which attack the respiratory tract offers at present the best solution of the problem. Even more attractive is the hypothesis that these ultra microscopic agents may act in symbiosis with various pathogenic bacteria. In spite of the temptation to accept the virus theory which is strongly suggested by contemporary work, the editors maintain the same excellent critique which is characteristic throughout the entire work.

FRANKLIN M. HANGER

The Biology of the Protozoa—*By Gary N. Calkins, Ph.D., Sc.D. (2nd ed.) Philadelphia: Lea & Febiger,* 1934. 607 pp. Price, $7.50.

Fundamental biological aspects of the unicellular animals, with observations on parasitic forms, are considered in a comprehensive manner in this volume by an author who has devoted many years to teaching and research. Illustrations are mainly from free-living forms. The concept, developed in the first edition, of a changing organization brought about by continued metabolism, has been amplified and furnishes the basis for an interpretation of life histories, biological phenomena of cell division, maturity, sex differentiation, fertilization, and senescence.

A new chapter on parasitism and disease has been added. Here are discussed effects of protozoan parasites on the host, parasitic flagellates including a list of species of trypanosomes, parasitic rhizopods, and the more important sporozoan parasites of man. The text is well illustrated with engravings and colored plates. This useful book has been materially strengthened by revision; it is carefully edited and well printed.

IRA V. HISCOCK

A Study of School Health Standards—*By Anette M. Phelan,* 1934. *Sold by the Book Service, American Public Health Association, New York, N. Y.* 249 pp. Price, $2.50.

This text is based on a questionnaire study of the opinions of 60 carefully selected individuals, whose official positions and activities would seem to indicate that they were competent to judge of the needs of a school health program.

Before arriving at the standards themselves, there is a good summary of much of the literature showing the development of school health procedures. This discussion and its bibliography are arranged conveniently in time periods.

After discussing the Problem, and Consideration of the Results as a Whole, there are presented chapters on the comparative merits of work done by professional and by lay workers, on the hygiene of the school plant, on the classification of children and special education, and on a group of other school health problems such as health of teachers and health education materials. The chapters on school plants, on classification of children and special education, and on the health of teachers and the use of health teaching materials are the most worth while of the text.

While there is much of value in this report, it is seriously weakened by the prolonged dull discussion of details as to procedure. The close adherence to thesis making formulae is possibly responsible for this.

There is some duplication of statements that more careful editing should have eliminated.

CHARLES H. KEENE

Diseases Peculiar to Civilized Man: Clinical Management and Surgical Treatment—*By George Crile, M.D. New York: Macmillan,* 1934. 427 pp. Price, $5.00.

In this book the author essentially continues his thesis of the kinetic drive which was developed a number of years ago. He has gone a step further and endeavored to show the essential physiological mechanism employed in producing a number of diseases peculiar to civilized man, such as neurocirculatory asthenia, hyperthyroidism, peptic ulcer, and diabetes. Elaborating upon the orthogenetic theory of von Nageli and Eimer, he strives to show that man has been developing along one peculiar line, namely, that of the brain, and that with this there has been a very marked development of thyroid and adrenal systems with especial development of the thyroid gland which tends to maintain emotional and mental activity at a constant high level as contrasted with the lower animals which need a more marked development of the adrenal system for a sudden energy demand in fighting, pursuit, or escape. Because of the over-activity of the hypothalamus, which genetically is the older part of the brain, and the center for emotional life, these organs are influenced by the sympathetic nervous system. In the more intellectually alert and emotional individuals there is likely to be too great activity of the adrenal system producing a lack of harmonic function. This in turn by increasing the activity of the hypothalamus, sets up a vicious circle which results in hyperthyroidism; increased activity of the islands of Langerhans causing diabetes; or the

rapid heart, cold sweaty extremities and fatigue of the neurocirculatory asthenia.

This book should be very stimulating to both the physician and the educated layman, as the approach to these diseases is considerably different from that of any other writers on the subject. However, the author has failed to consider some aspects of two important diseases: (1) the tendency of diabetes to follow acute infections as postulated by Allen, and (2) the very definite geographical distribution of hyperthyroidism. It would seem here that the thesis of the author has not fully explained their etiology.

E. D. BASKETT

Keeping Campers Fit: The Theory and Practice of Camp Nursing—*By Elena E. Williams. New York: Dutton,* 1934. 227 pp. Price, $2.50.

After an excellent summary of the needed qualities for success as a camp nurse and of the general scope of her "job," there are chapters on medical equipment in camp and for various types of trips, medicines most likely to be needed, emergency appliances, and treatments; a discussion of types of cases likely to be met varying all the way from poison ivy and camp accidents to communicable disease control; and technic of artificial respiration; and health and first aid instruction.

There is also a chapter on the legal responsibility of the nurse and one on preventive measures, such as physical examinations of campers — including height and weight—dietary care, respiratory, skin, and eye-ear infections, contagious disease control, and the control of fatigue.

This is an excellent text, evidently based on experience as well as on training. It should be extremely valuable, not only to camp nurses, but to camp directors and counselors and to others responsible for the health of camps or campers. CHARLES H. KEENE

Introduction to Food Bacteriology—*By Andrew Moldavan, M.Sc. Lancaster, Pa.: Science Press,* 1934. *Distributed by the Author.* 172 pp.

In the short space of 172 pages the author has endeavored to present a concise survey of the whole field of bacteriology, and of food bacteriology in particular. Much information has been condensed into a small space and consequently only one-third of the contents has been allotted to food bacteriology.

It is evident that a thorough study of the most recent literature has been made and that the author has sifted out that information which he considered most pertinent for use in this volume.

The book is too technical and condensed for the lay reader and would need supplementary explanation to make many points understandable to the average college undergraduate in science. For use in a short course to more advanced students well versed in the sciences, or as a means of review for the professional man, the book would be of value.

More care in the proof reading would have helped in eliminating numerous mistakes which detract from the quality of the book. J. A. CLAGUE

A Health Program for the Children of a County—*By Thomas Gordon Bennett, Ph.D. New York: Bureau of Publications, Teachers College, Columbia University,* 1933. 196 pp. Price, $2.00.

This study assembles a mass of data which has appeared already in various reports and surveys from individuals and organizations, both public and private. The 5½ pages of fine print bibliography at the end attest this fact. Much of the material deals with school health programs and health education, although other elements are given due consideration.

The original part of the study is sup-

plied by a survey of the health conditions of Queen Anne's County, Md., for the year 1930–1931, and the application of accepted principles to the organization of a County Health Unit.

The chapter on the Health Center is well conceived and sets forth clearly, concisely, and to the point, the objectives, organization, administration, and financial support for a health center as it might be developed in a typical county. It is definitely stated that "the medical, social, and welfare service should function as a *complete unit* in the health program for the children of a county."

The method of presentation and format of the book follows the familiar pattern of the Bureau of Publications of Teachers College, Columbia University.

RICHARD A. BOLT

Industrial Toxicology.—*By Alice Hamilton, M.D. New York: Harper,* 1934. 352 pp. Price, $3.00.

This compact little octavo contains a wealth of material upon industrial toxicology, excellently organized, comprehensive, and tersely stated. The author is too well known in this field to need introduction, even to the rank and file of lay persons, at least those who read. Contrary to one's expectation, this book is not a mere abstract of the author's larger work on *Industrial Poisons in the United States,* but is quite an independent monograph based upon the author's own broad experience and no less than 655 citations from perhaps half of that number of investigators whose names have appeared within the "scientific era," and, of course, largely those of recent times. We noted many references as of 1931 and some later.

With a fitting introduction viewing the health of the working class and its protection against poisoning, the ten chapters are devoted to the principal industrial intoxicants. However, each poisonous substance is considered as an entity in itself. The more important are given proportionate attention, while there is an adequate discussion of both sides of controversial matters.

A fairly close scrutiny has failed to find material errors. (We did note the undoubted substitution of the term "carbon monoxide" for "carbon tetrachloride" in the reference to Boveri on page 275, but the context would prevent misconstruations here.) While the range of authors cited is enormous for a book of this size, occasional important omissions can be noted, such as reference to K. B. Lehmann's rather extensive article regarding carbon tetrachloride in the *Zentralblatt für Gewerbehygiene, u.s.w.,* May, 1930, the annual reports of the Committee on Lead Poisoning of the American Public Health Association, Oliver's "Dangerous Trades" (1902), and a very few others. Advisedly, we think, for the present time, the author has omitted any reference to silica and whether or not this substance is a "poison." Certain headings which the average practitioner might be seeking in the Index are wanting, such as "spray painting" and "duco," but practically everything to be expected is covered.

An especially commendable feature of the little volume is an alphabetically arranged author-bibliography which shows extensive inclusions from all languages, as well as an author-index for references used in the volume itself.

The author's easy reading style flows on most intriguingly, scarcely ever repeats, and is constantly in contact with its source material. The number of substances covered, from cause to treatment, should create a large demand for the book from all who could be possibly interested in the subject. It is written for physicians but a little use of a dictionary by the lay reader will bring most of its material within easy grasp—and surely in this day and

age, such should be considered a laudable step in self-education.

EMERY R. HAYHURST

Modern Drug Encyclopedia and Therapeutic Guide. *By Jacob Guteman, M.D. New York: Hoeber,* 1934. 1,393 pp. Price, $7.50.

The above named book, as stated by the author, is intended for physicians, dentists, pharmacists, and medical students; and consists of "a presentation of 8,160 modern, non-pharmacopeal, medicinal preparations, comprising 1,878 drugs and chemicals, 535 biologicals, 860 endocrines, 1,563 ampule medicaments, 209 medical foods, 129 mineral waters, 2,344 individual and group allergens, and 642 miscellaneous products."

This array of therapeutic armamentarium gives an idea of the scope of the book and indicates how rapidly the number of therapeutic preparations is increasing. Of the making of them there seems to be no end. The busy physician cannot keep pace with such cumulative array, so he welcomes an up-to-date summary of new and old preparations together with their uses. Older physicians were taught to know a few drugs well, their indications and uses. Modern practitioners have at least to know a little about a great many new ones. For one disease listed in this book there used to be recommended half a dozen drugs or preparations, this volume names no less than sixty.

Dr. Gutman's book is a valuable reference book for the office or library. It claims to be unbiassed in its statements, by which is apparently meant that the general claims of the manufacturer of the product are set forth without criticism. Some of the preparations mentioned while effective for indicated ailments have been found to carry certain hazards, such as sensitization of the individual. No comment is made on these hazards. While a few of the preparations belong to the class described by the authors of *100 Million Guinea Pigs,* most of them are Medical Council accepted.

The book sets forth, in order, drugs of known constitution and action, effective combinations, preparations of indicated composition, endocrine preparations, preparations of undeclared composition, endocrine preparations, hypodermic medicaments, biologicals, allergens, foods and beverages, bottled mineral waters, and miscellaneous products, together with a therapeutic guide containing indications for use of preparation mentioned. An exhaustive bibliography with indices is appended.

The volume is well printed and sizeable, considering the wide field covered.

JAMES WALLACE

Tuberculosis in the Child and the Adult—*By Francis Marion Pottenger. St. Louis: Mosby,* 1934. 611 pp. Price, $8.50.

Back of this book is the ripened experience of a veteran tuberculosis clinician and crusader. It bears the benchmark of a good teacher—orderly sequence, familiarity with the work of others, and the clearly stated opinions of the author on all debatable and unsettled questions.

The student approaching the problem of tuberculosis for the first time as well as the well read specialist will appreciate especially the chapters on the chronological development of the disease. "Koch's phenomenon," understanding of which is basic to a working knowledge of tuberculosis, gave the impetus to extensive research work. But much that has been written about allergy, sensitivity and immunity is so confusing, if not conflicting, as to leave the student in a maze. Dr. Pottenger's clear description of the successive steps of tuberculosis from the time of the first infection, interpreted in terms of the response of the host to infection and

reinfection, helps to clear the picture. He may have his leanings where theory must bridge the gap, but he has obviously not been stampeded into extreme positions; the story holds water and enables one to understand the complex phenomena resulting from infection. With that as a background, succeeding chapters on the pathogenic changes, the symptoms predicated on them and the varying responses of the host to the tubercle bacillus, are equally illuminating.

There are few corners of the field which Dr. Pottenger has not personally explored, hence he writes with equal facility on the epidemiology, pathology, clinical technic, and surgery of tuberculosis. The critic might object that certain aspects are unduly dilated, leading one to suspect that the author is a hobby rider. He would doubtless point to the chapter on tuberculin therapy, the painstaking description of pulmonary reflexes elicited by palpation, the discussion of visceral neurology, but these are special fields in which the author has made original and pertinent observations. In fact, it is this feature of the book that lifts it out of the common run and places it in the distinguished merit class.

The illustrations, nearly all original, are of excellent quality and aptly fit the text. H. E. KLEINSCHMIDT

Children, Young People and Unemployment, Part III. *The Save the Children International Union, 15, Rue Lévrier, Geneva, Switzerland.* Price, $.50.

Part III of the series of inquiries into the effects of unemployment on children in Bulgaria, Esthonia, Finland, France, Hungary, Norway, and Sweden follows a presentation similar to the material in Parts I and II. Two special chapters on The Crisis and Juvenile Delinquency in Belgium by Paul Wets and Unemployment and Prostitution of Young Girls by F. Sempkins are included.

While these reports are not exhaustive, they do give a fair picture of what has happened to the youth in these European countries as a result of the depression and unemployment. The conclusions sum up the series of reports: "We come now to the crux of the problem. It must be recognized that when parents cease to contribute in any way to the well-being of the child, and when food, clothing, care, love, all the child's needs, are provided *outside the home*, his relationship to his parents must obviously be affected; so, too, ultimately, the durability of the home and of the family. This must be kept in mind when we come to study the methods of welfare work necessitated by the crisis."

An appendix gives a tabular statement of relief measures which may be employed. RICHARD A. BOLT

Medicine. A Voyage of Discovery —*By Josef Löbel, M.D. Translated by L. Marie Sieveking and Ian F. D. Morrow. New York: Farrar and Rinehart,* 1934. 341 pp. Price, $3.00.

This is a well written book of unusual interest. It is a glorification of medical science, and sound reasons are assigned for giving it this exalted position. It is in a large sense a history of medicine, most of which is accurate, though unfortunately, some statements are not.

The author holds that the desire for knowledge probably found its first impetus in medicine, though he recognizes that the first researches were instituted on account of purely practical motives. There are chapters on the underlying sciences, since "a doctor must know something of every calling if he is to understand his own properly." The doctor must understand humanity and life as a whole, looking upon the individual as a link in the continuity of life.

"Anyone wishing to study medicine must first of all realize the fact that everything living forms a unity, that in nature there is but one difference—though indeed this is the greatest contrast of all—the difference between life and death."

The translation from the German appears to be excellent, though there are certain mistakes which one feels must be due to errors in translation or misunderstanding of the author's meaning.

On the whole the book can be recommended to doctors and especially to laymen, most of whom have no conception of the tremendous field which must be covered by the well educated physician nor of the equally large field which must be gained by contact with his fellowmen, especially those who are not entirely normal either through physical or mental illness.

MAZYCK P. RAVENEL

The Pneumoconiosis Bibliography and Laws—*By Davis, Salmonsen and Earlywine. Chicago: Industrial Medicine,* 1934. 482 pp. Price, $7.50.

The remarkable interest shown in the subject of pneumoconiosis stimulated by the exceedingly large number of claims throughout the entire country warranted expectation of an authoritative publication on the subject that would answer the needs of those who have made this subject their special field of interest. *Pneumoconiosis Bibliography and Laws* is a unique collaboration by a physician, lawyer, and reference librarian, resulting in the production of a reference work and source book that will be found to be both convenient and of immense practical value to those interested in the litigation of claims for pneumoconiosis or silicosis. Though the medical features are missing, this gap may perhaps be filled with a subsequent work on the subject.

The ambitious task set up by the authors of this publication is divided into two sections. The first section on bibliography comprises two-thirds of the entire book, while the remaining section is confined to the subject of the compensation and common law as they relate to dust and its effect on the lung.

The bibliographical material is comprehensive and covers all the references that have both historical and scientific application. There are 2,768 references compared to 1,272 listed by the *Bibliography* published by the International Labor Office as of December, 1931. Not all the historical references are included. One by Martin Pansa, 1614, on "Diseases of Miners and Foundry Men in Annaberg," is not included. A few irrelevant references are noted. Such references as the *Textbook of General and Pathological Anatomy* and other references on lead poisoning seem out of place in a bibliographical account of this kind. The arrangement of the bibliographical material is excellent and many devices have been incorporated to aid the reader in quickly reaching references desired. The value of any bibliography, of course, depends chiefly on the ability of the authors to keep it up to date. The authors in their preface promise to do this by publishing subsequent editions of this reference work.

With regard to the section on Laws, a certain amount of confusion exists in that the title of the book would lead one to believe that the common law or compensation law with specific reference to pneumoconiosis would be considered. However, numerous decisions are quoted covering not only the wide field of occupational disease with such cases as dermatitis and lead poisoning, but also including other decisions with reference to the legal construction of the term "accident." There is, of course, a distinct advantage in including such labor laws as safety, hygiene and hour laws since they may have a direct bearing on

specific cases of litigation in pneumoconiosis. However, the title of the book gives no indication that the broad field of legislation as it applies to industrial hygiene would be covered. The decisions regarding lead poisoning and other occupational hazards are, therefore, essentially irrelevant. It would have been more appropriate to have confined these court decisions to those affecting alleged cases of lung fibrosis or pneumoconiosis alone.

One important decision in the case of the Pennsylvania Pulverizing Company vs. Butler, 61 F. (2nd) 311, is not included. This is an important decision since it establishes a precedent in the field of occupational disease litigation that an employer must only exercise reasonable care and need not furnish any unusual or protective devices or information in protecting his worker.

The field of industrial hygiene is a vast one and its ramifications are many. It is difficult, therefore, to confine oneself to any single field. However, this study will have a distinct value for those who have the practical task of arbitrating and adjudicating these claims. HENRY H. KESSLER

BOOKS RECEIVED

THE CARE AND FEEDING OF CHILDREN. 15th ed. By L. Emmett Holt, Jr. New York: Appleton-Century, 1934. 259 pp. Price, $1.25.

AMERICAN POCKET MEDICAL DICTIONARY. 15th ed. By W. A. Newman Dorland. Philadelphia: Saunders, 1934. 920 pp. Price, Plain, $2.00, Thumb Index, $2.50.

A SOLDIER IN SCIENCE. The Autobiography of Bailey K. Ashford. New York: Morrow, 1934. 425 pp. Price, $3.50.

A TEXT-BOOK OF MEDICAL DISEASES FOR NURSES, INCLUDING NURSING CARE. 2d ed. By Arthur A. Stevens and Florence Anna Ambler. Philadelphia: Saunders, 1934. 513 pp. Price, $2.75.

A TEXTBOOK OF BACTERIOLOGY WITH A SECTION ON PATHOGENIC PROTOZOA. 7th ed. By Hans Zinsser and Stanhope Bayne-Jones. New York: Appleton-Century, 1934. 1226 pp. Price, $8.00.

A MANUAL OF SOCIAL DISEASES. For the Layman. By Franklin H. Church. Salem, N. J.: S. D. Publishing Co., 1934. 37 pp. Cloth, $1.00, Paper, $.50.

THE JEW IN SCIENCE. By Louis Gershenfeld. Philadelphia: The Jewish Publication Society of America, 1934. 224 pp. Price, $2.75.

MEDICINE MARCHES ON. By Edward Podolsky. New York: Harper, 1934. 343 pp. Price, $3.50.

HOW TO SUCCEED IN LIFE. By Grenville Kleiser. New York: Funk & Wagnalls, 1934. 330 pp. Price, $2.00.

TUBERCULOSIS IN THE CHILD AND THE ADULT. By Francis Marion Pottenger. St. Louis: Mosby, 1934. 611 pp. Price, $8.50.

A SELECTED PUBLIC HEALTH BIBLIOGRAPHY WITH ANNOTATIONS

RAYMOND S. PATTERSON, PH.D.

Brave New World—If you suffer from hardening of the mind, don't attempt this philosophic discussion about whither we are heading; but if you can survive the impact of broad ideas, treat yourself to this mental meal in which there is much red meat especially prepared for sanitarians.

COYLE, D. C. The Changing Order of Today. Pub. Health Nurs. 26, 7:565 (July), 1934.

Modern Health Administrative Measures—Valuable indeed is this brief, straightforward review of the newest public health practice in relation to diphtheria immunization, undulant fever, pellagra, and a dozen other health problems.

CUMMING, H. S. Some New Developments in Public Health. Pub. Health Nurs. 26, 7:358 (July), 1934.

Providing Medical Care—Adequate medical care and preventive services rather than benefits in lieu of wages lost through illness must have priority in any American scheme of sickness insurance.

DAVIS, M. M. The American Approach to Health Insurance. Milbank Quart. 12, 3:203 (July), 1934.

Adolescents' Hearts—In New York about 1 per cent of all adolescents have organic heart disease; a third do not know it. Adequate facilities for the care of cardiacs do not exist.

GOODMAN, M. and PRESCOTT, J. W. Heart Disease Among Adolescent School Children of New York City. J.A.M.A. 103, 3:157 (July 21), 1934.

Fall Colds—During the early fall months a higher than normal respiratory rate is associated with lower than normal temperature, a subnormal number of hours of sunshine and an increased relative humidity.

GOVER, M., *et al.* Time Distribution of Common Colds and Its Relation to Corresponding Weather Conditions. Pub. Health Rep. 49, 28:811 (July 13), 1934.

Wanted Babies—The economically fortunate families are practising contraception successfully and producing babies mainly as they want them. The families least favored economically make the least effort to control conception and their efforts are least successful. This is due primarily to ignorance of conceptive methods and not to the desire for large families.

PEARL, R. Second Progress Report on a Study of Family Limitation. Milbank Quart. 12, 3:248 (July), 1934.

Depression-Poor Children—Poor children contract communicable diseases earlier than children in better circumstances. But the "new-poor" have not been in straitened circumstances sufficiently long for their children to acquire the illness immunity of those of the chronically poor.

PERROTT, G. St. J. and COLLINS, S. D. Sickness and the Depression. Milbank Quart. 12, 3:218 (July), 1934.

Disease and the Injured Lung—The relationship of pneumoconiosis to tuberculosis has been studied extensively. This paper broadens the inquiry to include other infectious processes of the lungs. In general, the silicotic lung is more susceptible than the normal lung to any bacterial invasion.

PROSKE, H. O. and SAYERS, R. R. Pul-

monary Infection in Pneumoconiosis. Pub. Health Rep. 49, 29:839 (July 20), 1934.

Fate of Amoeba in Water Purification—Although *E. histolytica* cysts are removed from water by the accepted methods of filtration, chlorine in the amounts usually applied to drinking water will not destroy the cysts.

SPECTOR, B. K., *et al.* Effectiveness of Filtration in Removing from Water, and of Chlorine in Killing, the Causative Organism of Amoebic Dysentery. Pub. Health Rep. 49, 27:786 (July 6), 1934.

Lines of Attack Against Heart Disease—Rational methods of prevention against rheumatic fever and essential hypertension must be developed. Syphilitic heart disease can be eradicated. For the prevention of arteriosclerotic heart disease, there is little to be hoped.

STONE, C. T. The Mortality from Heart Disease: A Challenge. J.A.M.A. 103, 3:151 (July 21), 1934.

Nature's Handiwork—Studies reveal that overweight people have a better capacity to endure prolonged strain than underweights. To this is appended the comforting conclusion that it is uncommon for overweight people to become underweight and *vice versa*.

TREADGOLD, H. A. Functional Efficiency and Body Build in the Young Male Adult. Lancet 1, 26:1377 (June 30), 1934.

Toxoid Immunization—Alum precipitated toxoid in one dose of 1 c.c. produced 100 per cent Schick negatives in the studies reported.

WALKER, A. A. One Dose Alum Toxoid in Diphtheria Immunization. J.A.M.A. 103, 4:227 (July 28), 1934).

Heat and Stopped Noses—Hill's observation that exposure to heat emanating from dark surfaces tended to close the nostrils was confirmed by this study. But his opinion that radiant heat did not produce the same undesirable phenomenon was not confirmed. Any heat will do it.

WINSLOW, C.-E. A., *et al.* The Influence of Heat and Light Upon Nasal Obstruction. Am. J. Hyg. 20, 1:195 (July), 1934.

ASSOCIATION NEWS

NEW MEMBERS

The following list includes applicants who have been approved for membership in the A.P.H.A. by the Sub-Committee on Eligibility. These new members have requested affiliation with the sections indicated, and action by the Section Councils will follow.

Health Officers Section

Thomas A. E. Evans, M.D., Farmers, Ky., Rowan County Health Officer

P. J. Fitzgibbons, M.D., City Hall, Amsterdam, N. Y., Health Officer

Roy O. Gilbert, M.D., 604 S. Maclay, San Fernando, Calif., District Health Officer

E. J. Latta, M.D., Gaston Bldg., Hastings, Nebr., City Physician

George N. Macdonell, M.D., City Hall, Miami, Fla., Director of Public Health

Dr. Manuel B. Marquez Escobedo, Paseo de la Presa # 37, Guanajuato, Gto, Mexico, Chief of Coördinated Sanitary Services

Perry A. Proudfoot, M.D., 220 Chestnut St., Roselle, N. J., Health Officer

Howard L. Sumner, M.D., Court House, Asheville, N. C., Buncombe County Health Officer

H. A. Tharp, M.D., Mansfield, La., Director, DeSoto Parish Health Unit

John D. Trawick, Armory, Louisville, Ky., Jefferson County Health Officer

Nellie S. Vernon, M.D., Associated Bldg., Astoria, Ore., City and County Health Officer

Laboratory Section

Louisa H. Bacon, M.D., County Hospital, San Bernardino, Calif., Director, County Charity Hospital Laboratory

Alvin G. Foord, M.D., Pasadena Hospital, Pasadena, Calif., formerly Instructor in Public Health and Communicable Diseases, Univ. of Buffalo Medical College

Beatrice F. Howitt, M.A., Hooper Foundation, San Francisco, Calif., Research worker in Poliomyelitis

Evelyn M. Krayenbuhl, A.B., 1330 Mill St., San Luis Obispo, Calif., Bacteriologist, County Health Department Laboratory

John J. Miller, Jr., M.D., University of California, Berkeley, Calif., in Department of Bacteriology

Burr T. Snyder, City Laboratory, Sacramento, Calif., Director of Laboratories

Fred Stimpert, State Board of Health, Helena, Mont., Director, Hygienic Laboratory

Harold A. Thompson, M.D., 907 Medico-Dental Bldg., San Diego, Calif., Bacteriologist, City and County Laboratory

Elsie Wattie, B.S., 8 Belvidere Ave., Worcester, Mass., formerly Biochemist, U. S. Public Health Service.

Public Health Engineering Section

Walter C. Elford, 1213 S. E. Malden St., Portland, Ore., Chief, Division of Pure Food and Sanitation of Board of Health

Raymond F. Goudey, Box 240, Los Angeles, Calif., Sanitary Engineer, Dept. of Water and Power

Industrial Hygiene Section

P. A. Bendixen, M.D., 512 Davenport Bank Bldg., Davenport, Ia., Designated Physician, United States Employees Compensation Commission

Food and Nutrition Section

Paul F. Nichols, M.S., 336 Hilgard Hall, Univ. of Calif., Berkeley, Calif., Assistant Professor, Division of Viticulture and Fruit Products

Victor C. Morgan, B.S., 7445 S. E. 31 Ave., Portland, Ore., Chief Milk Inspector, Bureau of Health

Child Hygiene Section

Amy L. Hunter, M.D., Dr.P.H., 17 Howe St., New Haven, Conn., Child Health Conference Work

Public Health Education Section

Helen M. Baukin, Territorial Bldg., Honolulu, T. H., Supervisor, Dental Division, Department of Public Instruction

Florence Becker, 3301 N. Charles St., Baltimore, Md., Director, Dr. Bloodgood's Clinic

Lloyd L. Cullimore, M.D., 290 W. Center, Provo, Utah, Medical Director, and Health Education Instructor, Brigham Young University

Marietta Eurton, R.N., 1266–7 St., San Diego,

Calif., Clinic Nurse, San Diego Tuberculosis Association

Harriet M. Fitzgerald, 2325 Milvia St., Berkeley, Calif., Dental Hygienist, Berkeley Public Schools

E. E. Gage, M.D., Sioux Falls, S. D., Superintendent, Health Department

Reuben L. Kaufman, M.D., C.P.H., 543 Earlham Drive, Whittier, Calif., County Health Officer

Caro Lane, South Georgia Teachers College, Statesboro, Ga., Teacher, Physical and Health Education

James D. Lennehan, 25 West 43 St., New York, N. Y., Secretary, Life Extension Institute

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Amy MacOwan, R.N., Palama Settlement, Honolulu, T.H., Director, Nursing Department

Margaret Mallett, R.N., 66 Safford St., Wollaston, Mass., Public Health Nurse

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NEWS FROM THE FIELD

DR. PETER DIRECTOR OF NAVAJO RESERVATION

W. W. PETER, M.D., Fellow and Life Member of the A.P.H.A. has been named by the Indian Office as Medical Director of the Navajo Reservation. He will function somewhat as a state health officer with the physicians of the various agencies throughout the territory corresponding to county health officers.

Dr. Peter has seen public health and medical service in many lands, including China, the Philippine Islands, the Malay States and near eastern countries. He served as the Director of the Council on Health Education; as Honorary Secretary of the China Central Committee of the American Red Cross; he was a member of the Chinese and Foreign Famine Relief Committee; Assistant Secretary of the American Public Health Association; Director of the Health Service of the Cleanliness Institute; and technical adviser to the Ministry of Health of China. He has lectured widely and is an authoritative writer on public health and health education.

The Navajo Reservation contains 25,000 square miles and has a population of about 45,000. The Navajos, like most American Indians, have a peculiar susceptibility to tuberculosis, and the incidence of childhood cases is high compared to that of the white race. Trachoma, too, has for many years taken a heavy toll from the Indian race. Control of these diseases constitutes a major problem on the reservation.

Dr. Peter will organize field clinics for the early detection of tuberculosis and set up a system of home instruction in disease care. He will attempt to segregate trachomatous children in boarding schools where they will receive regular intensive treatment, keeping the unaffected children in the day schools where they will be shielded from infection.

In time it is hoped to make a comparable attack upon the venereal disease situation.

It is the plan to interest leading Indians in every community in health problems. Local boards of health will be established with a representation of Indians on them, and Indian sanitary inspectors are to be employed. Already one Indian public health nurse has been trained and sent into the field. It is felt that by placing the responsibility of health largely on the Indians themselves a real attack can be made upon disease among the Navajo.

Memorandum, Office of Indian Affairs, Dept. of the Interior, Washington, D. C.

SICKNESS INSURANCE OF SCHOOL CHILDREN IN SWITZERLAND

SICKNESS insurance of school children, as a supplement to insurance of adults, is required by law in 8 of the 25 cantons of Switzerland, among them Geneva and Saint Gallen; in 7 other cantons, including Bern and Zurich, such insurance is required only in some communes. In several cantons the insurance law applies only to children attending kindergarten or elementary public school; in others it applies to all children of certain ages, whether they attend school or not.

Each insured child pays into the insurance fund about 15 to 20 francs annually ($2.80 to $3.80); in case of poverty the payment is made by the commune; in addition the federal

government and the cantons contribute together about half of this amount.

The purpose of the insurance is to provide medical attendance and medicines in case of illness or accident; also when necessary special kinds of treatment, such as ultraviolet-ray, X-ray, or orthopedic. Undernourished children and those in need of recuperation or rest are sent to special resorts in the country or in the mountains. Parents or guardians failing to insure their children or wards are subject to penalties.

The number of insured children increased from 25,000 in 1914, when the social insurance law of 1911 went into effect, to 338,000 in 1932. According to recent reports from Switzerland, the system of children's insurance has been working well. The expected reserves have been accumulated; large numbers of children have been sent to rest homes; and the sick children have been supplied with all the necessary treatment.—*Le Assicurazioni Sociali*, Rome, 1934, No. 1.

DEATHS

MISS ELIZABETH A. GREENER, principal of the School of Nursing and superintendent of nurses at Mount Sinai Hospital, died July 26th at Montclair, N. J.

For the last 2 years she was president of the New York State League of Nursing Education, and she had been president of the New York State Nurses Association. She was one of only 3 nurses ever to receive the French Government's decoration of the Medaille d'Honneur de l'Hygiene, conferred on her in 1927 in recognition of her contributions to the field of the nursing of children.

THE death of Dr. E. L. Cornman, President of the Gilliland Laboratories, Marietta, Pa., came as a great shock. He had been in bad health since November, 1933, following an accident in the field at a dog trial. His condition had progressed favorably and he was considered out of danger and on the road to complete recovery. His death at the last was quite sudden.

Dr. Cornman has been a member of our Association for 8 years. He has been a strong supporter of the Association, always had an exhibit for the Gilliland Laboratories at our meetings, and attended regularly himself. He was a graduate of the Veterinary Department of the University of Pennsylvania. He will be mourned by a wide circle of friends not only in our Association, but in the American Veterinary Medical Association of which he was a prominent member.

HEALTH SERVICE IN ALASKA

DR. VANCE MURRAY of the U. S. Public Health Service, recently detailed to the Indian Bureau, has been appointed Medical Director for the Alaskan Indian territory.

A dentist, 20 hospital nurses, 23 village and traveling nurses, and 6 doctors carry on the Indian Service medical work in Alaska. They will all be supervised and directed by Dr. Murray. Besides this group of government people, there are a few private physicians and medical missionaries, and most of the salmon canning factories maintain a physician.

Over a territory extending from Juneau, his headquarters, Dr. Murray will travel as far as Point Barrow, at the extreme northern tip of Alaska, supervising and directing the Indian medical work.

NEW YORK STATE NURSES' CONVENTION

THE NEW YORK State Nurses Association and its affiliated bodies will meet in Buffalo October 15 to 19

in annual convention. The general theme of the program will be "The Nurse and Community Relationships."

Among the many speakers scheduled are Dr. Thomas Parran, Jr., Dr. Donald Armstrong, Clara Quereau, and Dr. George Ruhland. Mrs. A. L. Hansen, 181 Franklin Street, Buffalo, is general chairman of the convention committee.

PERSONALS

EVART G. ROUTZAHN, F.A.P.H.A., will, on October 1, retire from the active staff of the Russell Sage Foundation of which he has been a member for twenty-two years. Happily this means no diminution of his service to the many and varied extra-mural activities with which he has long been identified. Social work and public-health education will continue to enjoy his contribution to their graphic and popular interpretation.—*Survey*, Aug., 1934.

JOHN HALL, of Freehold, N. J., member A.P.H.A., has been elected Executive Secretary of the New Jersey Health and Sanitary Association.

DR. ZACK P. MITCHELL, of Weldon, N. Car., has been elected Health Officer of Vance County. The county has been without a health official since the resignation of Dr. Crete N. Sisk, of Henderson, the early part of the year.

DR. FRANK S. FELLOWS, of the U. S. Public Health Service, who is now medical director of the Indian Bureau in Alaska, has been transferred to the southwest (territory including Arizona, New Mexico and southern Colorado) with headquarters in Albuquerque, N. Mex., to succeed Dr. Langdon R. White, who has been transferred to the territory surrounding Minneapolis.

CONFERENCES

Sept. 2, State Laboratory Directors' Conference, for Directors of State Laboratories and their principal assistants only, University Club, Pasadena, Calif.

Sept. 3–6, 63rd Annual Meeting, American Public Health Association, Pasadena, Calif.; headquarters, Huntington Hotel and Maryland Hotel.

Sept. 4–6, 9th Conference of the International Union Against Tuberculosis, Warsaw, Poland.

Sept. 10–13, 13th annual scientific and clinical session of the American Congress of Physical Therapy, Philadelphia, Pa.

Oct. 8–10, Annual Meeting of the Association of Military Surgeons of the United States, Medical Field Service School, Carlisle Barracks, Pa.

Oct. 15–18, 17th Annual Meeting of the American Dietetic Association, Washington, D. C.

Oct. 15–19, American College of Surgeons, Boston, Mass.

Oct. 15–19, Annual Convention, New York State Nurses Association and its affiliated bodies, Buffalo, N. Y.

Nov. 13–16, Southern Medical Association, San Antonio, Tex.

Nov. 16, 17, 60th Anniversary Meeting, New Jersey Health and Sanitary Association, Berkeley-Carteret Hotel, Asbury Park, N. J.

Dec. 27–30, Annual Science Exhibition of the American Association for the Advancement of Science and Associated Societies, Pittsburgh, Pa.

April 29–May 3, 1935, 19th Annual Clinical Session of the American College of Physicians, Philadelphia, Pa.